

SUPPLEMENTARY NUMBER
TO THE
MONTHLY MAGAZINE.

No. XXVI.—VOL. IV.

ORIGINAL COMMUNICATIONS.

For the Monthly Magazine.

HALF-YEARLY RETROSPECT OF THE
STATE OF DOMESTIC LITERATURE.

EVERY friend to the improvement of man in arts, sciences, and civility, must feel a mingled emotion of pleasure and astonishment, in contemplating that the column of literature in a neighbouring country should remain uninjured amidst the double shock of foreign and intestine warfare; that it should stand erect amidst such desolating contests,

Like some tall clift that lifts its awful form,
Swells from the vale, and midway leaves the storm;

Though round its breast the rolling clouds are spread,

Eternal sunshine settles on its head!

That column which has been raised on our own soil, thank Heaven! has not yet been exposed to such rough weather; how well it would stand so long and severe a tempest, we dare not conjecture; but an examination of its several parts, however superficial, will afford us the satisfaction of knowing, that our countrymen are continually adding to the stability of the fabric, and improving the elegance of its workmanship.

HISTORY.

It is indifferent, perhaps, whether under this head, or that of POLITICS, be mentioned the Abbé Barruel's "Memoirs illustrating the History of Jacobinism:" this is a work which has excited considerable attention; it is divided into three parts, of which the two former only have yet come before us. The grand and *ultimate* object of this performance is evidently to cast a reproach on those persons who attempt the slightest reformation in politics or religion; we did not, however, want the Abbé to inform us, that in all civil convulsions arise men of profligate and ferocious principles, who occasionally succeed in the usurpation of authority, and scourge the people, whose credulity and

MONTHLY MAG. XXVI.

ignorance assisted their designs. These monsters, in the abbé's opinion, have existed in every part of the world, at every period of time, and have kept up a systematic and hereditary conspiracy against the comfort and tranquillity of mankind! The *first* part of the present work contains a development of the *Anticristian conspiracy*; many illustrious names appear in this heretical band: Voltaire, d'Alembert, Frederic II. king of Prussia, the emperor Joseph II, the empress Catharine II, many modern philosophers, and many other royal personages. The *second* part unfolds the *antimonarchical conspiracy*; it is unnecessary to say that all the crowned conspirators seceded from *this* nefarious coalition. A history is here given of Freemasonry, whose grand secret, it seems, is liberty and equality. There is a great deal of curious matter in this division of the work, on the *truth* of which each reader must form an opinion for himself. The *third* part is to display the principles of the *illuminés*, a secret society established about thirty years ago in Bavaria: this is called the "*antisocial conspiracy*, or that of the sophisters of impiety, coalescing with those of anarchy against every government, without even excepting the republican, against all civil society, and all property whatever." It is curious that professor Robinson, of the university of Edinburgh, should have published a work at the same time, on precisely the same subject; it is entitled, "Proofs of a Conspiracy against all the Religions and Governments of Europe, carried on in the Secret Meetings of Free-masons, Illuminati, and Reading Societies." The authenticity of many statements in this confused performance is rendered extremely questionable, from the circumstance of the credulous professor's being under the necessity of publicly retracting in an advertisement, a gross and calumnious assertion which he had inserted against one of his neighbours.

A translation has been given of M. de Rulhières "History of the Revolution in Russia,"

Russia," which precipitated the grandson of Peter the Great from his throne, and elevated the late empress, Catharine the Second; the author was present at that sanguinary scene, and from his situation at Petersburg, in the suit of M. de Breteuil, minister-plenipotentiary of France, had opportunities of personal acquaintance with the principal conspirators.

A translation has also appeared from the manuscript "Memoirs relating to the French Revolution, by the Marquis de Bouillé." Many interesting particulars are narrated in this volume, of the coalition which was formed by the European princes for the restoration of monarchy: the marquis had the sole conduct of the king's flight to Varennes, and has given a copious account of the affair at Nanci, exculpatory of his own proceedings. The celebrated M. Neckar has published two octavo volumes "On the French Revolution:" as may be expected, they display considerable talent, and labour to refute the various calumnies which have been circulated against the administration and principles of that unfortunate financier.

M. Pagès' "Secret History of the French Revolution" will probably disappoint every one who places much confidence in pompous title-pages: the author does not seem to have possessed any *secret* information, nor has he communicated many particulars which have not long been before the public: his narrative is unconnected, and his style inflated. A translation has appeared from the "Campagne du General Buonaparte en Italie:" this work, if it be deficient in point of arrangement, is written in a very animated style, and the subject of the memoir renders it extremely interesting. A plain, but faithful translation has appeared from the Spanish, of "Don Juan Baptista Munoz." This author's valuable "History of the New World" was undertaken by command of the late king of Spain; without depreciating the value of Dr. Robertson's History of America, we may anticipate, that much new matter will be found in the present work, of which the first volume only is at present published, drawn from documents and original papers, which were inaccessible to our own industrious and elegant historian. "An account of Portugal, as it appeared in 1766," has been translated from the French of General Dumouriez: it was originally printed at Lausanne in 1775, but the present has been revised by the author, and enlarged by much additional and important matter.

POLITICAL ECONOMY.

A new edition has been published in one volume, quarto, of Mr. "Ruggle's History of the Poor:" the observations of this writer breathe such benevolence, and the plans which he has suggested for ameliorating the condition of that degraded and miserable portion of our fellow-creatures, are so wise, so salutary, and so humane, that Sir Frederick Eden will not blush to have this work placed on the same shelf with his own valuable volumes on the subject. Mr. Ruggle has detailed the account of a small experimental *school of industry*, from which it appears that the produce of the children's labour exceeded the expenditure for their food and clothing. We are happy to find it announced in the advertisement to the seventh of "Count Rumford's Political, Economical, and Philosophical Essays," that he is at present engaged in a similar experiment: he is forming a public establishment for the education of a hundred poor children of both sexes, from five to six years of age, who, he expects, will immediately be able to pay for their own maintenance, and be prepared to enter the world at some future period, as useful members of society. Mr. Sebatier has written a somewhat elaborate "Treatise on Poverty, its Consequences, and the Remedy." Many salutary regulations are suggested in this work, but some of the author's observations, particularly where he is enlarging on the *causes* of poverty, are by no means sound. The first part of this work defines, "who properly come under the denomination of poor;" in the second, are stated the consequences of poverty, namely, crimes, encumbrance to the public, or emigration. We are pleased with the *simplification* which Mr. Sebatier recommends in teaching religion: the *mysteries* of which are too unintelligible to be of much practical importance. Dr. Buchan has put together some commonplace "Observations on the Diet of the Common People;" but "The First Report of the Society for bettering the Condition, and increasing the Comforts of the Poor," well merits the public attention; as do the "Outlines of an Attempt to establish a Plan for a Just and Regular Equivalent for the Labour and Support of the Poor:" the plan is to make the coin of the kingdom correspond with the weight; that is, that a farthing, halfpenny, penny, &c. might every where be used as weights. Mr. Aclom Ingram's "Enquiry into the present Condition of the Lower Classes," &c. contains an able investigation of various subjects connected with political economy, th

the study of which science, he recommends (and we most heartily agree with him in the recommendation), should form a considerable part of education in our public schools. Mr. Ingram discusses the intricate subject of finance with as much perspicuity, perhaps, as it admits, and ably examines the injurious policy of the corn-laws: the reduction of the price of provisions is a subject of distinct and particular attention.

Every one must feel a glow of satisfaction in contemplating, that **POVERTY** is not merely the theme of idle and unmeaning commiseration, but that it has of late excited a particular attention, which has been followed up by various and valuable plans for its relief. "The essential principles of the Wealth of Nations, in opposition to some false Principles of Dr. Adam Smith," is an octavo pamphlet, which condenses, in a few pages, much sound political reasoning, expressed in perspicuous language: the author is a partizan of the French *économists*, as they are called, whose principles were impugned by Dr. Smith, which latter gentleman is said by this ingenious writer to have mis-stated their doctrines in one or two important particulars: it is shown in this pamphlet, by a clear calculation, that had a rent been raised from the period of the revolution, when the land-tax was imposed, of four shillings in the pound on the rent of land, at present we should have had no national debt in existence: the author, though an "Economist," however rejects some parts of the "Economical system." Mr. Marsh, the well-known translator of Michaëlis, and one among the numerous opponents of the humiliated Travis, has translated from the original of M. Patje, president of the board of commerce and finance at Hanover, "An Essay on the English National Credit." Such persons as have money in the English funds, however, will not perhaps feel much consoled at the following reflection; nor will the people of England much thank him for it: "*that the taxes may be augmented, to defray the increased interest of the national debt.*" Many good observations occur in this pamphlet, but when an order from the privy-council can in one arbitrary instant suspend payment in the national bank, a wise man's confidence in the public credit is considerably weakened. Daniel Wakefields, esq. has replied to the "Thoughts of the Earl of Lauderdale," and the "Appeal" of Mr. Morgan, in "Observations on the credit and finances of Great Britain;" it is unreasonable, says he, to suppose that the expences of government alone

should stand still, when the experience of every housekeeper proves, that three hundred a year now will scarcely go as far as two hundred a year twenty years ago! surely it had never occurred to this gentleman, that the *reason* why the expences of every housekeeper have increased so oppressively within the last twenty years, is, that the pockets of the people have been drained to supply the extravagance of government! A valuable "Collection of Tracts" has been published "On Wet Docks for the port of London, with Hints on Trade and Commerce, and on Free Ports." One great object of this useful work is, to afford local accommodation to the ports of the Metropolis; and the *other*, to make Great Britain the grand emporium for commerce. "The Iniquity of Banking" has been ably argued in a pamphlet of two parts; the author contends that the circulator of bank-notes as certainly commits a robbery on society, as were he to gather a tax from it; because there is no difference between enhancing the price of commodities and lessening the value of money; and a man is equally injured, says he, in having the money reduced, and such is undoubtedly the operation of bank-notes, as by having a part of it taken away. "Read, or be Ruined," is a pamphlet, the flippancy of whose title prepared us for much arrogance and quackery: we were agreeably disappointed in perusing an argumentative production, where the author glances at the commencement, progress, and expenditure of the present desolating war. The defalcation of taxes, and a comparison of the amount of the customs for several years, with the exports and imports, are brought as an Hibernian proof of the increase of our trade and manufactures: the permanent taxes, says this writer, in 1793, fell short of those in 1792, to the amount of £400,000: those of 1794 were short of those in 1792, £500,000: those of 1795 were less than those of 1792, about £800,000: and those of 1796 fell short of those of 1792, to no less an amount than £1,100,000! Is this a proof of the increase of our trade and manufactures? We cannot agree to the opinion of this writer, however, "that national economy would be national ruin." Some of Sir Francis Baring's "Observations on the Establishment of the Bank of England," &c. are solid and ingenious; they are deficient, however, in point of arrangement, and his proposal, that in all cases bank-notes should be legal tender, is to be reprobated with all possible indignation,

tion, and resisted with all possible power. Mr. Fry's "New System of Finance," is a small work, embracing a great deal of curious and important matter; the humour of the style is a very good relief to the dryness of the subject.

POLITICS,

As usual, have employed a variety of pens: and although perhaps, they do not, in general, display much depth of research, much novelty of remark, or much brilliancy of genius, for our own part, we feel no little satisfaction in the proofs which are evinced of the general attention which is paid to the subject. It is curious that Mr. Burke's Letter to the Duke of Portland, which it has been very neatly observed, "like a snail from its shell, just made its appearance and retired," should have again put out its horns, and once more have crawled into notice; the executors of that gentleman are gratifying, or rather indeed, *taking in* the public with several of his detached pieces, previously to the publication of the posthumous volume, which, we understand, is to be added to the elegant edition already in three volumes quarto. The executors are *taking in* the public, for "The Two Letters on the Conduct of Domestic Politics; including Observations on the Conduct of the Minority in the Session of 1793," which those gentlemen have published, are under a new name; and, with but little addition, the forty-five articles of impeachment against Mr. Fox, which were spuriously published by Owen. These accommodating executors, have also published Mr. Burke's "Third Letter, &c. on the Proposals for Peace;" they have moreover informed us, that it is not an exact transcript from the author's copy! but it certainly bears strong internal marks of authenticity, for it is a very common sewer of metaphorical filthiness. Mr. Burke's "Three Memorials on French Affairs, written in the years 1791, 1792, 1793," contain some short hints for a memorial, which the author wished to have been delivered to M. Montmorin, by Lord Gower, offering the interposition of the king of Great Britain, to reconcile the differences which then existed in France. In a former production, Mr. B. denounced about 80,000 incurable Jacobins, and in the present, this meek Christian has proscribed, in one merciless list, most of the dissenters of the three denominations, with the restless who resemble them, of all ranks and all parties; the whole race of half-bred speculators, all the atheists, deists, and Socinians, all who hate the clergy and

envy the nobility, many of the monied people, and the East Indians almost to a man! *Obe jam satis!* The following specious advertisement announced the publication of much original matter from the same pen; together with "Memoirs of the Right Hon. Edmund Burke," by Charles M'Cormick, LL.B.

The Injunction.

"The regular sale of the above work having been prevented by menaces held out to the trade, the author is obliged to become his own bookseller. But he begs leave to assure the Lord Chancellor, and the public, that he never had any idea of doing what the injunction forbids. Every reader of the Memoirs will be convinced, that if Mrs. Burke, Dr. Laurence, or Dr. King, had been in possession of the papers from which the most interesting extracts are given, they would not have suffered them to see the light."

In a "Second Letter to the Hon. Thomas Erskine," Mr. Gifford "throws about his dung with an air of" somewhat more "gracefulness" than he did in his first; his attempt, however, to exculpate England from the charge of aggression, respecting the origin of the present war, is, in our opinion, laboured altogether in vain. A second part is published of the interesting "Correspondence of the Rev. C. Wyvill with the Right Hon. William Pitt, in the year 1785, for an improved Representation in Parliament:" this latter gentleman's conduct will serve as a most curious text-book to future commentators; but all the scholiasts in the world, *cum notis variorum*, will be puzzled to reconcile his inconsistencies, or account for them on any rational principle—but a loss of memory! In an "Impartial and Comprehensive View of the Present State of Great Britain," by the Rev. G. S. Keith, the subject of retrospective, or, more properly, of retro-active taxation, is treated in a tone of becoming indignation: the author supposes, that it would only be necessary for a man who possessed a little animation of character, and who was charged for a duty by a retro-active law, to bring the officer who demanded it before such a judge as Lord Chief Justice Holt, and "a proper jury named by him," (why so?) "and I have no doubt," says he, "of the event; for the people of England have never delegated the judiciary power—they exercise it themselves." In a "Cursory View of Civil Government, chiefly in Relation to Virtue and Happiness," the author, Mr. Ely

Ely Bates, tells us, that government can do little towards human happiness, and that, *therefore*, we should be happy with the administration of it! If the former part of this proposition be true, the rankest Jacobin could not have offered a better reason for the subversion of the British, and every other, constitution! A Jacobin, however, would have drawn another inference than this writer has done, and a more logical one too: is it a subject of satisfaction to the people, he would argue, that government can do little towards human happiness? Rather, surely, of discontent, that they are obliged to pay so much for such an unequivalent return! Mr. Norgate has republished, with the addition of "notes and historical elucidations," the celebrated "Dialogue between a Gentleman and a Farmer, on the Principles of Government," by the late and much-lamented Sir William Jones. A very sensible and sound "Address to the County of Kent, on their Petition to the King" for removing Ministers, has been written by an eccentric character, Lord Rokeby: the noble author advises an immediate peace with the Republic of France, prognosticates an evil train of consequences from continuing the present nefarious war, and combats the various objections which have been urged against the conclusion of a peace, in a powerful and impressive manner. His lordship enters on the subject of Parliamentary Reform, and balances the merits, and a variety of plans, which have been brought forward for that purpose, with a steady and impartial hand: without objecting to universal suffrage, he thinks it adviseable not to adopt it (at present, alas, the advice is most unnecessary!) from a respect which he thinks should be paid to ancient forms and opinions. "*Vindiciæ Regiæ; or, a Defence of the Kingly Office*, in Two Letters to Earl Stanhope," is the production of a clergyman, who *insinuates* the divine right of kings, at the same time that he attacks Lord Stanhope for having *insinuated* a divine proscription of them; this pamphlet, notwithstanding a little old-fashioned doctrine, is evidently written by a gentleman of learning and ability. Several of the "Suggestions on the Slave-Trade," which are offered by Sir Jerom Fitzpatrick for the consideration of the British legislature, are humane and important: his plan for the abolition of the trade is to operate gradually, very gradually, indeed! since he mentions, as a matter of course, the *conti-*

nuance of importation, and proposes some regulations for the purchase of fresh slaves in Africa! "Disguise thyself as thou wilt—still slavery—still thou art a bitter draught! And though thousands in all ages have been made to drink of thee, thou art no less bitter on that account!" Had Sir Jerom Fitzpatrick enjoyed one-half of Yorick's sensibility, he would never have proposed such a cold blooded plan for emancipation, as that we have just perused: but he is entitled to thanks even for this crawling scheme! "A Gentleman, independent of Party," as he calls himself, has suggested "The Political Salvation of Great Britain, by means entirely new:" perfectly so, indeed! A reform in the representation of the House of Commons, he proposes, should be effected solely by the interposition of—the House of Lords! It gives us some pleasure that the author of this plan cannot *wriggle* himself into either party. In a pamphlet of Mr. Yorke's, "On the Means of saving the Country," we are happy to observe, that his violent democratic effervescence has subsided: in cool moments, we discover in Mr. Yorke, much good sense, patriotism, and a talent for reasoning. The writer of a "Letter to the Seceders" from attendance of the House of Commons, considers them as having abandoned their posts, at a time when, by their own account, the country is in great danger: a formal justification of the seceders, would require more room than we can allot to the subject; it appears to us, however, that the Opposition had beaten the air with an idle and impotent fury, quite long enough! nor are ministers, it seems, a little galled at the secession. Mr. Fox's very animated "Speech, delivered at the Crown and Anchor, on the anniversary of his election," contains an ample justification of the conduct he has pursued; and, consequently, of such members as have pursued the same. A few other political pamphlets have been published within the last six months; but we should lengthen this portion of our retrospect most tediously, were we to enumerate every squib that is thrown out: we proceed, therefore, to the subjects of

GENEALOGY AND ANTIQUITIES.

The family of Ruffel is traced up to a Norman, of the name of Hugh de Rossel, who accompanied William the Conqueror in his successful expedition into England, in "Anecdotes of the House of Bedford." Much curious matter is related of the numerous

numerous descendants of this ancient Norman; and the character of lord William Russel is evidently drawn by a gentleman well disposed to do justice to the virtues, and commiserate the sufferings of that illustrious and unfortunate nobleman. The "History of Burleigh House" is an entertaining volume, and may, moreover, be considerably useful to such persons as visit the magnificent seat of the earl of Exeter: the style of writing, however, it must be acknowledged, is most laughably florid; and the volume is swelled with a long account of pictures, and of painters, which many readers will not think very interesting. The taste for genealogy, and knowledge of that science, which Mr. Noble has before displayed, well qualifies him for the task of collecting "Memoirs of the illustrious Houses of Medici." The memoirs commence with the life of John, who may be considered as the founder of the family, and end at the period when the sovereignty of Florence was transferred to the house of Austria. Mr. Noble is extremely negligent as to his style; his phrases are often vulgar, and sometimes ungrammatical. He is said to have made considerable use of lord Orrery's letters, by Mr. Ludger, who has translated "The Life of Bianca Cappello," from the German of M. Siebenkees. In the translator's preface and notes to this latter very interesting work, Mr. Noble is said to have entirely mistaken the character of this extraordinary woman, as also those of her second husband, Francis Maria, grand duke of Tuscany, and his successor, the cardinal Ferdinand, whose character is completely exonerated, in our opinion, from the charge which is brought against him of a double murder. "The Remarks," by Mr. Lumisden, "on the Antiquities of Rome and its Environs," will be valued by the classical scholar for their ingenuity and accuracy; the subject of Roman antiquities is inexhaustible. The present volume is illustrated with engravings, and enlarged by an appendix, which, independent of other matter, contains an account of Præneste, Albano, and Herculæum. Mr. Macpherson's "Geographical Illustrations of Scottish History," will be found a most valuable auxiliary in perusing the ancient chronicles, histories, and records, of that country. Mr. Green has given, as a sort of addendum to his History and Antiquities of Worcester, "An Account of the Discovery of the Body of King John in the Cathedral Church of that City." On the skull of the skeleton was found the celebrated monk's cowl, in which he is recorded to have been buried, as a

passport through the regions of purgatory. A twelfth volume has been published of the "Archæologia," which, like the former, contains much curious matter relative to antiquity.

VOYAGES AND TRAVELS.

Under this head the most popular and important work is, "Sir George Staunton's Embassy to China." Of a country so little known, of such high antiquity, such immense population and extent, the slightest additional information is valuable. The present volume abounds with interesting matter on the customs and manners of the people, together with reflections on the religion and political economy of the empire. The compiler of this long-expected work observed, "that among the vast crowds which were attracted by the approach of the embassy, not a single person solicited charity, or was to be seen in the habit of a beggar. This," he says, "may be in some measure accounted for, from the encouragement which the state affords to family connections: descendants from a common stock assembled at stated times before the tomb of their ancestor, and a natural tendency is thus created to perpetuate domestic intercourse, and, in all cases of distress, to ensure reciprocal assistance. The child, moreover, is bound to support, as far as he is able, a parent in poverty; and a brother, similarly circumstanced, is equally bound to take care of a brother; even the most distant kinsman has a claim on his relation. To which must be added, that the emperor Tien Lung, a sagacious and benevolent monarch, always steps forward in cases either of famine or other general calamity, orders the public granaries to be opened, and *remits taxes* to such as labour under peculiar affliction. The Chinese, it is well known, have no state religion: the emperor is of one sect, the mandarines of a second, and the people of a third; notwithstanding which, they seem to have a most expensive attachment to priests: at Poo-ta-lu (the cathedral of the emperor, near Zhe-hol, his palace in Tartary) are 800 priests, and 3500 on other foundations! In China there is no hereditary dignity; and the mandarines are chosen after an impartial examination of the candidates in Chinese literature. Notwithstanding hereditary nobility is unknown, pedigree is an object of the highest attention; and so great is the ambition of illustrious descent, that the emperors have frequently *antedated* dignities, and granted titles to the deceased ancestors of a man of merit." "Indeed every means are used," says

says Sir George Staunton, "to stimulate to good, and deter from evil actions, by the reward of praise, as well as by the dread of shame. A public register, called *The Book of Merit*, is kept for the purpose of recording every instance of meritorious conduct; and, in the enumeration of a man's titles, the number of times that his name had been so inserted is particularly mentioned; for faults, on the other hand, he is usually degraded; and it is not deemed sufficient only that he should assume his reduced title, but he must likewise add to his name the fact of his degradation.—Respecting the population, revenues, and extent of China, the *first*, taken in round numbers from the statements of Chow-ta-Zhin, is 333,000,000 souls, within the great wall: as to the *second*, the square miles are 1,297,999, and the number of acres 830,719,360: concerning the *third*, the revenues received into the imperial treasury amount to 36,548,000 takels, or ounces of silver, and 4,245,000 measures of rice, or other grain. The following estimate will show the taxes to be extremely moderate: supposing silver to represent property, and bear the same proportion to the consumable commodities, among the Chinese which it does among Europeans in general; if the whole revenue of the former were reduced to a capitation, it would not amount to more than *five* shillings a head on the population of the empire. The people of Ireland, on a similar computation, pay to government *eight* shillings a head; those of France, previously to the revolution, *sixteen*; and each individual of Great Britain at least *thirty-four*!" A cheap edition has been published of Sir George Staunton's entertaining work.—A lively and good-humoured traveller has published his "Sketches and Observations made on a Tour through various Parts of Europe." The rapidity of this gentleman's movements reminds us of poor Leonora and William, in that sweet ballad of Bürger, which has of late been so often translated:

"And hurry-scurry forth they go,
Unheeding wet or dry;
And horse and rider snort and blow,
And sparkling pebbles fly."

His pen and his horses are alike rapid, and alike sprightly. A neat and well-written translation, by Mr. Wright, has appeared of the manuscript of "Baron de Wimpfen's Voyage to St. Domingo." The baron resided in this colony during the years 1788, 1789, and 1790. Many generous and humane reflections occur on the subject of slavery by this gentleman, who is

certainly well qualified to make them, and who relates several facts, of which he was an eye-witness, corroborative of the cruelty, which some persons affect to disbelieve, is commonly exercised by slaveholders on those unfortunate fellow-creatures who have fallen into their merciless grasp. "I must observe," says the baron, "to the eternal shame of the Europeans, that if the law which debases the Mulattoes, by devoting their posterity to slavery, is observed with the most rigorous exactness, it is not so with another, which expressly ordains, that every master shall give each of his slaves two pounds and a half of salt-meat every week." In a small volume of "Travels in North America," by M. Crespel, that gentleman has given a very affecting narrative of the hardships which he suffered in a shipwreck off the too famous island of Anticosti, at the entrance of the river St. Lawrence. M. Crespel first published this narrative in French; and the description of the island is written by Mr. Wright, who passed a winter there, and surveyed it by order of government. Mr. Southey, so well known as a poet, has written "Letters during a short Residence in Spain and Portugal:" these letters are intermingled with an account of Spanish and Portuguese poetry: the author has transfused the spirit of his originals with the utmost felicity into his translations. He has analysed a curious Portuguese epic poem, written on the marriage of Charles the Second of England with the princess Catharine of Portugal. Mr. Southey's style of writing, as would be expected, is lively, elegant, and entertaining. In an "Historical Essay on the Ambition and Conquests of France," the author traces, to a very early date, the origin of that hatred which subsisted on the part of France against Great Britain and the house of Austria. We by no means agree with the politics of this author, in general, but are happy to hear from a gentleman of his opinions an acknowledgment, that the ferocious disposition which the French people has displayed was generated by the despotism of their government. A sounder argument against despotism has never yet been urged.

TOPOGRAPHY.

Mr. Hutchinson has published the concluding volume of his "History of the County of Cumberland," &c. It contains a fund of interesting matter on the various subjects of botany, mineralogy, antiquities, arts, agriculture, &c. The map of the county is beautiful, and appears to be accurate. The descriptive portion of this work,

work, though inadequate to the scenery, which is the subject of it, is a relief to the dry genealogical investigations, which are unnecessarily abundant, and to the biographical accounts of a number of *men of property*, whose birth, parentage, and education, is as uninteresting as impertinent to the subject of this work. Mr. Maton's "Observations, &c. on the Western Counties" display considerable taste and knowledge in a variety of branches of natural history. These observations are illustrated by a mineralogical map, and adorned with sixteen views, in aqua-tinto, by Alken. Mr. Roots has translated into English "The Charters of the town of Kingstone on Thames:" such a list may be serviceable to the historian, and interesting to the antiquary; but to the general class of readers it will, of necessity, be dull. "A Description of the Town and Fortrefs of Mantua:" the author, M. Hasselmeyer, a lieutenant in the Imperial army, has given a very spirited account of the military operations which preceded the fall of that city, and, much to his credit for impartiality, has done justice to the perseverance and intrepidity of both armies. Mr. Price, in the "Ludlow Guide," has given, in an accurate and entertaining manner, the ancient and modern history of that town and neighbourhood.

BIOGRAPHY.

Many valuable publications have appeared in this interesting and useful department of literature: "The Works of Sir Joshua Reynolds, &c. to which is prefixed, an Account of the Life and Writings of the Author," have been edited, in two quarto volumes, by the laborious Mr. Malone, whose long habits of intimacy with that illustrious character, and whose unusual opportunities of furnishing himself with materials to render the biography of his friend valuable and amusing, prepared us to expect a work far different indeed from the dull and ponderous performance with which he has presented us. After all the labour of Mr. Malone, we know but little of the life and writings of Sir Joshua, which we had not long since learned from a hundred publications. In the second volume, however, is a Journey to Flanders and Holland, in the year 1781; which having never been before published, and containing very masterly criticisms on the style of some celebrated painters, is highly valuable; the character of Rubens is particularly striking. These volumes are certainly valuable, as they contain a *collection* of the works, which had hitherto

been scattered, of Sir Joshua Reynolds. It may not be amiss to mention, that, in Mr. M'Cormick's Memoirs of Mr. Burke, it is flatly stated, that every one of those addresses, for which the president of the Royal Society has enjoyed such celebrity, were written by Mr. Burke, who was known to receive 4000*l.* for the job. "The Life of William late Earl of Mansfield," by John Holliday, of Lincoln's Inn, Esq. contains, perhaps, as copious an account of him as is to be expected: materials which might have formed a complete biography, together with his lordship's manuscripts and library, were destroyed in the year 1780. A translation has appeared of the manuscript "Memoirs of the Life of Lord Lovat, written by himself, in the French Language." They are divided into two parts; the first relates the cruelties which the author says he experienced from the family of Athol; and the second dwells on the persecutions which were employed against him, for a number of years, by the court of St. Germain's. Lord Lovat is well known to have been beheaded on Tower Hill, for the part he took in the last rebellion; and though the principal circumstances of his life and fortune are notorious, the present memoirs will be far from uninteresting to the reader. "Tisso's Life of Zimmerman" has too much panegyric in it, but contains abundant matter for reflection on the weakness and inconsistency of man. The subject of this biography was of an hypochondriacal temperature, and, in the latter days of his life, was afflicted with what Dr. Darwin would denominate a maniacal hallucination: he fancied himself penniless and destitute, and that the enemy was plundering his house! Mr. Harwood has published "Alumni Etonenses; or, a Catalogue of the Provosts and Fellows of Eton College, and King's College, Cambridge, from the Foundation in 1443, to 1797." Eton has undoubtedly been the mother of many a learned man; but a catalogue of provosts and fellows, three centuries in length, is not likely to afford much general utility or entertainment. The "Authentic Memoirs of the Life and Reign of Catharine II, Empress of all the Russias," are loose and unconnected anecdotes, which all the world knew long ago. The "Memoirs of Charette, &c. by an Emigrant of Distinction," are an eulogy on the valour and humanity of that great man. On the authenticity of the narrative we have no opinion to offer. We must

must not forget the "Biographical Anecdotes of the Founders of the French Republic." This little volume is written with much spirit and vivacity, and contains a variety of original and very interesting matter.

CLASSICAL LITERATURE AND CRITICISM.

The learned and laborious Dr. Vincent has traced the "Voyage of Nearchus from the Indus to the Euphrates:" this voyage, so daring and dangerous during the infancy of navigation, when it was projected, was undertaken by command of Alexander, for the purposes of obtaining a knowledge of the Persian and Arabian Gulphs, and of establishing a commercial intercourse between Egypt and India. Dr. Vincent has collected his materials from the original journal, preserved by Arrian, and illustrated the voyage by authorities, ancient and modern. Many geographical charts accompany this curious work, which displays deep investigation, assiduous research, and very extensive learning. An abstruse philological "Essay on the Originality and Permanency of Biblical Hebrew," is the production of the Reverend Gerald Fitzgerald, professor of Hebrew in the university of Dublin. The objects against which so much Hebraical and chronological learning are applied, are the doctrines which Mr. Paine has preached in his *Age of Reason*. Mr. George Baker has translated the "History of Rome, from the Original of Livy." Mr. Baker seems perfectly to have entered into the spirit of his author, and has accommodated his ideas to the English idiom, without wandering too widely from the original meaning. Notes and illustrations are added to this work, which have done credit to the translator, and service to the public. Professor Porson has edited, for the use of schools, the "Hecuba of Euripides:" it is illustrated with a few short notes, principally explaining the grounds of the emendations. The indefatigable Mr. Wakefield has published some ingenious critical "Remarks" on the preceding book, and expresses just surprize that his name is not even mentioned by the learned professor. Mr. Clugbe's poetical translation of "Horace's Epistles to the Pisos on the Art of Poetry," is faithful, yet familiar. In the same gentleman's translation of "Horace's six Satyrs, in a Style between free Imitation and literal Version," the familiarity becomes ridiculous, if not disgusting: to make Horace talk about Dr. Trusler and little Borrow-haski, is literally coupling, like another

MONTHLY MAG. XXVI.

Mezentius, the living with the dead. Mr. Boscawen has published a second volume of his "Translation of Horace." Mr. Boscawen is undoubtedly a man of taste and learning; and if we are disappointed in the perusal of his version, it is probably from the impossibility of doing justice to the original in the English language. The "Musæi Oxoniensis Speciminum fasciculus secundus," abounds with curious and recondite learning; and great critical acumen is displayed on the part of those learned gentlemen, whose communications have enriched this interesting work. Mr. Plumptree has attempted to corroborate his former conjecture, that, under the character of Gertrude, Shakespeare intended to calumniate Mary Queen of Scots, in an "Appendix to his Observations on Hamlet."

NATURAL HISTORY AND PHILOSOPHY.

In the entomological department, the indefatigable and most ingenious M. Sepp is yet busily employed. A second volume has appeared of the "Insects of the Netherlands, described from his own Observations, exactly drawn from the Life, engraved and coloured by that celebrated and very accurate Naturalist." A work so splendid and so beautiful, does not often come before us, even in these times of extravagant iconography. A translation has appeared of M. Von Ussler's "Chemico-Physiological Observations on Plants, with Additions by M. Schmeisser." From the results of several experiments, decisive that an accelerated germination in plants is produced by the application of oxygen, M. Ussler observes, "that the quantity of super-oxygenated muriatic acid (which he recommends should be mixed with the water for moistening the seeds) may possibly be too great; in which case the plant becomes over-irritable from the accumulation of oxygen; for the same reason he advises also, that the germinating plants should not be immediately exposed to the sun; light is too powerful a stimulant. M. Schmeisser's "System of Mineralogy" is a laborious work, not a little obscured by the uncouth jumble of German and English idiom which pervades it. Dr. Okely's "Pyrology; or, the Connection between Natural and Moral Philosophy," contains some curious, but unconnected matter: the investigation of Calorique is fanciful and ingenious; it is a sort of deity with the doctor—omnipresent and omnipotent! life and sense depend on it; the action of the soul on the body, and the body

body on the soul! Dr. Bourne's "Introductory Lectures to a Course of Chemistry, read at the Laboratory in Oxford," is appropriate, and well calculated to excite in his pupils an ardour in pursuing the science. Mr. Nicholson's "Journal of Natural Philosophy" is yet in its infancy; from the well known talents, however, of that gentleman, every thing is to be expected from a work under his immediate direction. The first part is published of the "Philosophical Transactions of the Royal Society of London for the Year 1797." The second part of Mr. Church's "Cabinet of Quadrupeds" is not inferior to the first, either in design or execution. Mr. Lewin has published a fourth volume of his "Birds of Great Britain." The present contains Ord. iii. Gen. xi. the *warblers, titmice, swallows, pigeons*. The execution of the plates is remarkably elegant, and by no means inferior to the former volumes of this valuable and truly beautiful work.

THE ARTS.

Messrs. Boydell and Nicol's promised edition of "Milton" is completed. The plates are engraved from the drawings of Mr. Westal; and Mr. Bulmer has adorned the work with all the splendour of typography. Mr. Chamberlain has published a set of "Engravings, from the original Designs of the Caracci, Annibale, Agostino, and Ludovico." The fifteenth volume of the "Transactions of the Society of Art," &c. contains, as all the preceding have done, many valuable communications on various subjects, connected with the comforts and conveniences of society. The funds by which this establishment is supported, appear to be in a flourishing condition; and, much to the honour of its members, premiums are distributed with an unsparing, but judicious hand. "The Repertory of Arts and Manufactures" continues to be conducted with care and spirit. Mr. Charnock has published the "Prospectus, and Specimen of an History of Marine Architecture," &c. This work is to be completed in three quarto volumes, if five hundred subscribers can be found. The subscription is nine guineas. Mr. Charnock estimates the expence of completing this work at 6000*l*. He appears, so far as the specimen affords ground for judgment, qualified for the laborious task he has undertaken; and surely it will be a disgrace to England, who prides herself on being mistress of the ocean, if every possible encouragement is not given to a work whose object is the history of naval architecture.

Since the death of Sir William Jones the streams of

EASTERN LITERATURE,

which used to circulate so copiously through this country, have flowed in a more languid current. Major Ouseley's "Oriental Collections," however, are designed to promote and facilitate the study of Oriental learning. Of this miscellaneous publication, it is intended that four numbers should appear annually; it consists principally of extracts from the Eastern historians, poets, and men of letters, in every department of science, illustrative of striking historical events, of the state of learning, and the antiquities of Asia. This work is expensive, and we are sorry to notice the insertion of many trifling articles unworthy the publication. "The Complaints, Consolations, and Delights of Achmed Ardebeili, a Persian exile, by Charles Fox, of Bristol," are suspected (upon what authority we give no opinion) to be original effusions of the latter. But, whoever be the author, he has woven for himself a wreath of beautiful and highly-flavoured flowers. Although some few of these poems have the pleasantry and simplicity of Anacreon, the greater part of them are tinged with the sable hue of sadness. A strong sense of religion pervades them; and if the author were indeed one of the *faithful*, they afford a most favourable specimen of Mahometan morality.

MATHEMATICS.

"The Almanac for the Year 1797, according to the true Time, as regulated by the Sun's Course and the Seasons," &c. is an ingenious attempt to reform the existing calendars. We cannot enter large into the plan: suffice it to say, that the author proposes the vernal equinox for the commencement of the year; the spring quarter to be the interval between that period and the summer solstice; the summer quarter to be comprehended between the summer solstice and the autumnal equinox: the autumn, to be the interval between the autumnal equinox and the winter solstice; and the winter to be included between the winter solstice and the vernal equinox. This volume well merits attention.

AGRICULTURE AND HUSBANDRY.

We cannot speak in very commendatory terms of Mr. Morley's "Practical Observations on Agriculture, Draining," &c.: they contain but little information which has not been in every farm-house long ago; and if just in themselves, which

which there is sometimes much reason to question, they are too common-place to be worth publishing. The same observations are, in some measure, applicable to Mr. Lawson's "Essay on the Use of mixed and compressed Cattle-foodder," &c. In this performance, however, are several judicious hints, although not a great many which can claim the praise of novelty. Dr. Hunter's "Outlines of Agriculture" we remember to have read twenty years ago in his Georgical Essays; and Mr. Bucknall's "Orchardist" is a collection of his own communications in several of the volumes which have been published by the Society for the Encouragement of Arts, &c. &c. Mr. Downing has written "A Treatise on the Disorders incident to horned Cattle," &c. Happily for the public, he has affixed, as a sort of *noli me tangere*, the modest price of half a guinea to his pamphlet of 131 pages! happily, for some of his receipts are so evidently absurd, not to say worse, that many a farmer's pocket might have been picked in the use of them. In "A short Treatise on the Glanders and Farcy, by a Lieutenant of Dragoons," it is contended, that these diseases are not local but general disorders, and the system of treatment which, under this idea is recommended, seems rational.—Under the head of

LAW,

have been published "Judicial Arguments and Collections, by Francis Hargrave." Mr. H.'s forensic abilities are so well known, that it is almost unnecessary to say, these arguments display much legal knowledge and elaborate research. Mr. Plowden's "Treatise upon the Law of Usury and Annuities," is not simply a professional work; Mr. Plowden appears in the character of an antiquary, and, indeed, of a political economist and historian, as well as that of a lawyer; and each of these characters he has supported with respectability. "The Speeches" have been published of the Honourable Thomas Erskine and S. Kyd, esq. at the Court of King's Bench, on Saturday June 24, 1797, on the trial of T. Williams for publishing Paine's Age of Reason. For the credit of Mr. Erskine, we could not but feel regret at a publication which has given an unnatural perpetuity to a speech, which, if it is disgraceful to his character as a man of consistent principles, of enlightened understanding, and liberal sentiment, is not less discreditable to his reputation for oratory, as a flimsy, confused, pompous, and contemptible declamation. That ex-

alted character whose cause Mr. Erskine has so unworthily pleaded, would have blushed at an advocate thus ignorant of its merits; he would have blushed at such petty rage, such foolish fierceness, and would have said to him, as he said to Peter, in a tone of unusual severity, "PUT UP THY SWORD." The sound and substantial argument which Mr. Kyd employed in defence of his client, or more properly speaking, in defence of that *cause*, which Mr. Erskine—we trust ignorantly—*attacked*, forms a striking and most creditable contrast to the puerile volubility of his antagonist. Mr. Paine, with his usual spirit and energy, has written "A Letter" to Mr. Erskine on the prosecution of Williams: his reasoning on the erroneous and sophistical manner in which it was conducted, appears perfectly conclusive. In this pamphlet is incorporated Mr. P.'s discourse to the Theophilanthropic Society at Paris, in which he appears, as Mr. Paine universally has done, in the character of a sincere and pious Theist. "The Trial of John Binns," &c. for sedition, has given to Liberty another triumph, in addition to those with which she has already been crowned in our courts of justice on former memorable occasions. Mr. Dawes has published "An Examination into the Two last Elections for the Borough of Southwark," &c. in which he arraigns the decision of the Committee of the House of Commons, in the case of Mr. Thelusson. Mr. Bird's "New Pocket Conveyancer" is too meagre for much consultation.

MEDICINE.

"The Medical Chirurgical Reform," proposed by Mr. Champney, as a plan for the regulation of the practice, is not sufficiently clear and compact: the case of the apothecary is most undoubtedly hard, when he is cheated of the reward which an attendance, perhaps in the dead of night, has well earned, by an order the next day from the physician to the druggist. Although Mr. Champney is somewhat obscure in his mode of expression, some of the observations which he has made well merit attention. Much important matter might have been expected from Dr. McLean's "Enquiry into the Nature and Causes of the great Mortality among the Troops at St. Domingo," from the situation, so favourable to observation, which he enjoyed in a large military hospital, at a time when the fatal fever raged so furiously in the island; that much important matter will be found, is not to be denied; at the same time, it is a little disappointment that the doctor has advanced so few facts which have not been long

long since known, and that his success does not appear to have been more than usual, in combating the malignity of the disorder. Mr. Home's "Practical Observations on the Treatment of Ulcers on the Legs, considered as a branch of Military Surgery," well merit attention: this ingenious practitioner justly deprecates the prevailing mode of treating all sorts of ulcers on one general plan. He has thrown them into classes, and endeavoured to adapt a rational mode of treatment to each. After the perusal of Mr. Home's publication, we were struck with Mr. Baynton's disregard of the different nature of different ulcers in his "Descriptive Account of a new Method of treating old Ulcers on the Legs." This is a valuable and ingenious work: and the practitioner appears to have been very successful in his new method, which is simply that of gradually drawing the sound skin over the sore by the application of slips of adhesive plaster. Dr. Rollo's "Account of two Cases of the Diabetes Mellitus," will not escape the perusal of many medical practitioners; his observations are sound and ingenious, his mode of treatment new and philosophical, and his application of the modern chemistry to medicine, satisfactory and successful. The second volume of this work states the result of the application of various acids and other substances in the cure of lues venerea: Dr. Rollo considers the antisyphilitic properties of nitrous and other acids to depend on the oxygene which they contain: that is, the syphilitic action is suspended for so long a time by a new and superior one, "that the whole virus, from the change which the fluids naturally undergo, is at last completely expelled from the body." Reports, principally concerning the effects of the nitrous acid in the venereal disease, by the surgeons of the Royal Hospital, at Plymouth, have been published by Dr. Beddoes, in which many strong cases are stated, which corroborate the truth of its possessing antivenereal virtue: it should be observed, however, that none of the patients have been cured later than April in the year 1797, consequently, apprehensions of relapse cannot perfectly have subsided. Dr. Beddoes moreover, with his usual candour, has given some results which were unsuccessful. "Mercury Stark-naked, &c. by Isaac Swainson," is published for the sake of a nostrum. A third part has appeared of Mr. Abernethy's "Surgical and Physiological Essays." The subject of the first is, "Injuries of the Head," in which Mr. A. objects to the frequent use which

the French surgeons make of the trephine: in an "Essay on Irritability," this ingenious physiologist brings several objections against the theory, that oxygene is the cause of irritability. Mr. Clarke's "Dissertation on the Use and Abuse of Tobacco," is a whimsical performance of some merit: he attacks this narcotic, sometimes with seriousness and sometimes with satire. Were it so noxious, however, as he represents, we should half of us have been poisoned before this time. Dr. Duncan's "Annals of Medicine, for the year 1796," is a continuation of the "Medical Commentaries:" in the second part are some curious cases and observations; and the work, as "exhibiting a concise view of the latest and most important discoveries in medicine and medical philosophy," is valuable. Most readers will probably be disappointed in the perusal of Dr. Alexander Monro's "Three Treatises on the Brain, the Eye, and the Ear:" in fact, the greater part of this expensive and meagre publication is taken up in establishing claims to medical discoveries, made in former days! and the treatises themselves contain but little which is not generally known. The second volume of Mr. Bell's "Anatomy of the Human Body," like the former, contains much useful matter; his language, however, is not always the most polished or even decorous. Mr. Kelson's "Few Remarks on the Nature and Cure of Colds," if they are not very convincing, are at least ingenious. Dr. Turton's "Medical Glossary," may be a work of useful reference: his explanations are clear and concise. Dr. James Hamilton, jun.'s "Select Cases in Midwifery, extracted from the Records of the Edinburgh Lying-in-Hospital, with Remarks," like almost all publications of the sort, contain a number of curious and extraordinary facts, which every medical practitioner will gladly refer to in cases of similar emergency. A seventh volume has been published of "Medical Facts and Observations; the character of this work has long been established, nor does the present volume impeach it. Dr. Crofield, who was last year tried for an attempt to assassinate the king, has written some "Remarks on the Scurvy," &c. wherein he recommends the use of opium. Mr. Kentish's "Essay on Burns," though the style is diffuse and affected, contains some curious cases and good observations on them.

THEOLOGY.

Whatever be the harvest, it cannot be said of labourers in the field of theology, that

that they are few. The indefatigable Dr. Priestley has published a second volume of "Discourses relating to the Evidences of Revealed Religion, delivered in Philadelphia," in which the general character of Jesus Christ is fully considered, the morality which he taught, and his manner of teaching it. A comparison is instituted between the doctrine of Christianity and those of Paganism and Mahometanism: the doctor indulges himself in some curious but visionary conjectures on the mode of future existence. Some readers may possibly smile at the arguments with which he repels an objection to the doctrine "of universal resurrection, and of all who shall be raised from the dead, living again upon this earth," arising from the idea of difficulty in gaining subsistence; and a farther objection to some being raised at the commencement of the millennium while the rest shall remain as at present, arising from a difficulty of conceiving how mortals and immortals can live on the same spot without interfering with each other---some may possibly smile to hear Dr. Priestley obviating these objections by a consideration of the present condition of Christ, Enoch, Moses, and Elijah, "who," says he, "are now living, it cannot well be doubted, upon this earth, though we have no knowledge where they are, or in what manner they subsist, and though we perceive nothing of their interference in the affairs of living men." In a small duodecimo pamphlet, Dr. Priestley has sketched a very accurate "Outline of the Evidences of Revealed Religion:" he has also, in a discourse delivered at the University-hall, in Philadelphia, recommended "The Case of Poor Emigrants." This discourse is well worthy of its author, for it breathes the purest philanthropy and benevolence. Some letters have passed in public, between M. Volney and Dr. Priestley, originating in an "Answer" of the former gentleman to the latter's "Observations on the Increase of Infidelity." Mr. Wilson's "Illustration of the Method of explaining the New Testament by the early Opinions of Jews and Christians concerning Christ," is a work of ingenious argument and deep erudition: it is intended as a refutation of the arguments adduced by Dr. Priestley and other learned theologians in favour of Unitarianism, drawn from the opinions of early Christians: the present author appears in the character of a controversialist, but he writes with all the candour and urbanity of a gentleman. Mr. Collier's "Historical and Familiar Essay on

the Scriptures of the New Testament," have not the simplicity which a correct taste requires. A second volume of Mr. Clowes's mystical and incomprehensible "Sermons," has made its appearance in public. A very sensible, shrewd, and competent editor, is re-publishing, at Mr. C. Taylor's, in monthly numbers, Calmet's great Dictionary of the Holy Bible; to this fund, already vast, of learning and research, the editor has made many valuable additions, under the title of "Fragments," which, as well as being instructive, are extremely entertaining; they are extracted from Oriental writers and travellers of reputed authenticity and merit. The learned Dr. Samuel Glasie has published "A Course of Lectures on the Holy Festivals." He justly observes, that they are in a great degree fallen into neglect, and the object of the present performance is to stimulate to a more devout and solemn observance of them. The doctor's orthodoxy appears in glowing colours. To deny the divinity of Christ is a *crime* which the reverend lecturer contemplates with abhorrence! From the eager credulity which he displays in narrating a string of traditions, some of them miraculous, it is not wonderful that he should consider as profane, those whose belief is not quite so comprehensive as his own. It should be mentioned, however, to the credit of Dr. Glasie, that he is chargeable with an amiable inconsistency, in deprecating contention and animosity between persons who differ in their religious opinions. Mr. Bicheno, on "The probable Progress and Issue of the Commotions which have agitated Europe since the French Revolution," though he attempts to interpret the mysterious book of Revelation, betrays no symptoms of that insanity which of late has distinguished the effusions of our unfortunate prophets. Sir Adam Gordon's "Occasional Assistant to the most serious of Parochial Duties," &c. namely, the visitation of sick persons, if to some it may favour of fanaticism, will be acknowledged by all to breathe a spirit of piety and resignation. Mr. Fuller, in a pamphlet entitled "Socinianism Indefensible," &c. has betrayed a pertness and illiberality, not very favourable to the cause which he maintains. Dr. J. Watkin's "Word of gentle Admonition to Mr. Gilbert Wakefield," &c. is uttered in so rough a voice, that it cannot possibly be his natural tone of articulation; this gentle admonitor has judiciously qualified the gentleness of his admonition, by a pretty copious sprinkling of Billingsgate abuse. Mr. Moore, in "An Attempt to recover

recover the original Reading of 1 Samuel, chap. viii. ver. 1," has displayed a considerable degree of critical sagacity: an enquiry is annexed "into the Duration of Solomon's Reign, interspersed with notes on various passages of scripture." "*Debitum fit Diabolo*---Give the Devil his due," is the motto of a pamphlet entitled "A Disputation in Logic, arguing the Moral and Religious Uses of a Devil," by Mr. Leycester, of Oxford. Mr. Leycester, however, has afforded no proof that he is either so logical or so humorous as he gives himself credit for. He announces a second part. Mr. Walker, author of *Elements of Geography*, and the *Universal Gazetteer*, has afforded the public a literal translation of the "Manual of the Theophilanthropes." Voluntarily associated, the members of these societies assemble on the first day of the week, and on the decades, for the worship of ONE ONLY GOD. The existence of this Supreme Being, and the immortality of the soul, are the only dogmas they admit: the assembly fits to hear lectures on morality, when the principles of religion, of benevolence, and universal toleration, are inculcated; the turbulent spirit of proselytism is checked, and the introduction of ceremonies, ornaments, and holidays, is discouraged. It ought to be observed, that the assemblies of the Theophilanthropes multiply rapidly, and are exceedingly crowded. Dr. Hey, as Norrington Professor in the University of Cambridge, has delivered a course of "Lectures in Divinity:" the doctor has fulfilled the duties of his situation with very considerable ability: bound by the fetters of an *established* system, he must, of necessity, have felt himself restricted in any range of speculation, which he might have been disposed to indulge. The professor, however, has brought into his lecture-room good sense and great ingenuity, combined with the result of extensive reading; and on the subjects of polemical divinity, the qualities of a controversialist, and the various ways of *missing the question*, much candour and sensible observation are united. If Mr. Parry's "Enquiry into the Nature and Extent of the Inspiration of the Apostles," &c contains but few novel reflections, his arguments are at least stated with perspicuity, and defended with candour and liberality. Dr. Burckhardt has attempted "A System of Divinity for the Use of Schools;" he offers this system as disencumbered from controverted doctrines, and embracing only such plain and essential points of religion as are univer-

sally acknowledged to be indisputable. In attempting to simplify this system of divinity, however, Dr. Burckhardt has substituted assertions for proofs; and in omitting the *evidences* of the divine authority of the Mosaic and Christian revelations, he inculcates a stupid credulity, rather than a desire of investigating the grounds of religious knowledge. The bishop of Ossory's "Charge to the Clergy of his Diocese," is a pious, learned, and dignified discourse, containing many valuable admonitions respecting the general demeanor of his clergy. If a pulpit orator were to adopt the precise "Manner in which the Common Prayer was read in private by Mr. Garrick," his audience would fancy themselves rather in a theatre than a place of religious worship: notwithstanding which, some good hints may undoubtedly be derived from a perusal of this pamphlet. An enumeration of the long and tedious catalogue of single sermons which have been published within the last six months, would be an unnecessary burden to our readers, and an unnecessary trouble to ourselves. A few of the best are Dr. Toulmin's "On the Injustice of classing Unitarians with Deists and Infidels;" Dr. Newcome's "On the Duty of Clerical Residence;" Dr. Law's "Charge delivered to the Clergy of Rochester;" Dr. Gregory's Sermon on "Suicide, delivered at an Anniversary of the Royal Humane Society;" Mr. Stone's discourse "On the Nature of Truth and Falsehood in general, and against each particular Species of Lies, the pernicious, the jocose, and the officious Lie." A good sermon on "Universal Benevolence," by Mr. Turner, who reprobates the savage practice of bull-baiting, and warmly enforces mercy to the brute creation. After all these, it must not be omitted, that a prebendary of Chichester, Mr. Fearon, has preached a sermon "On occasion of laying the Foundation-stone of Freemasons-hall." High encomiums are passed on the *patriotism and loyalty* of the freemasons. What would Professor Robison or the Abbé Barruel have said, if either of them had formed a part of the congregation?

POETRY.

Under the head of Oriental Literature, we have already mentioned Mr. Fox's "Translation of the Plaints, Consolations, and Delights of Achmed Ardebeili;" nor have the Muses of this western hemisphere hung up their harps in silence. The "English Lyrics" are not vulgar effusions; they are characterized by delicacy

cacy of sentiment, an easy flow of versification, and a chaste but luxuriant imagery: the 'Lines found in a Bower facing the South,' and the 'Stanzas written for the Blind Asylum, at Liverpool,' are peculiarly sweet. The author of "Lyric Poems" is also entitled to very considerable praise. An "Elegy to the Memory of the Rev. William Mason," is solemn, dignified, and pathetic. The "College" is a most dull satire; and Peter Pindar's "Ode to the Liverymen of London," not above mediocrity. "Walter and William" is said to be translated from the original of Richard Cœur de Lion: it reads much more like a mangled translation from Bürger's *Leonora*. The "Pursuits of Literature" are now completed, in four parts: a work burdened with such learned lumber, and disgraced with such clumsy and malignant raillery, does not often appear. D. Tytler's "Translation from Scevole de St. Marthe's *Pædotrophia*," is respectably executed. Mrs. Charlotte Smith's "Elegiac Sonnets" are many of them beautiful; but the monotony of everlasting sorrow grows tiresome to the ear. The "Sea-side," by Mr. Simkin Slenderwit, is not a contemptible imitation of the New Bath Guide. The "First Flights" of Mr. Heyrick---are his last! This eccentric young man was gathered unto his fathers, while yet the proof-sheets were in his hands of these poems, which breathe a disposition warm and passionate. Mr. Sharp, late of Oxford, has published a poem, entitled, the "Church," of much merit: perhaps the soberness and dignity of blank verse render it a good vehicle for satire and ridicule: it is *Tom Thumb in Tragedy*; the contrast is striking and ludicrous. Mr. Jackson's "Reign of Liberty" is, we fear, more distant than he imagines; he has depicted it in glowing colours. Mr. Bidlake's "Country Parson" is more to be admired for accuracy of description, than brilliancy of poetical imagery. In two volumes of "Select Epigrams," it would be hard, indeed, if none of them were good: the collection, however, is, on the whole, sprightly and judicious. The professor of poetry in the university of Oxford is publishing, in monthly numbers, a set of "Lectures, showing the several Sources of that Pleasure which the human Mind receives from Poetry." Those which have already appeared are so excessively trifling and superficial, that Dr. Hurdis will discredit his office if he

does not speedily amend. Mr. Donogue's "Juvenile Essays on Poetry," will be criticised with candour, by every man of feeling, who is informed they were written under the severe pressure of poverty. Mr. Fawcett, whose pulpit Elocution is so justly celebrated, has published a volume of "Poems:" as may be expected, the language is elegant, and the imagery rich. Mr. Gorton's "Negro Suicide," though far from a faultless production, is not destitute of poetical merit. Mr. Smith's "Poems are many of them in the Scottish dialect, and are by no means unworthy imitations of poor Burns.

THE DRAMA.

The author of that animated, but most seductive and dangerous novel, the *Monk*, Mr. Lewis, has translated Schiller's tragedy of *Cabal and Love*, which he has chosen to call the "Minister," that it may not be confounded with a mangled and feeble translation, which appeared some time ago; and, like the original, was entitled *Cabal and Love*. Mr. Lewis has done justice to his author: his translation is faithful, elegant, and energetic. Mr. Boaden is indebted to the last and very popular production of Mrs. Radcliffe, for the foundation of a play, which he has entitled the "Italian Monk:" although the latter cannot be said to excite such strong and terrible interest as the original, it does credit to the dramatist. Mr. Boaden has deviated from the romance, in reclaiming the character of Schedoni, and restoring him to domestic happiness: the scene of this monk's death, in the original, if successfully copied, might have been too tragical for the stage. Mr. Rough's "Lorenzino di Medici" is somewhat too tame to be interesting. Mr. Morton's "Cure for the Heart-Ache;" Mr. Reynolds's "Will;" Mr. Smith's "Cottage;" and several other dramatic pieces, have had a short-lived approbation in the galleries of a theatre. Mrs. Inchbald's "Wives as they Were," is to be selected from the mass of plays as a correct and elegant, if not a very animated performance. The poetry in Mr. Birch's "Smugglers," is better than musical dramas usually afford.

NOVELS AND ROMANCES.

At this time of the year, in the very depth of winter, let the grave Dons say what they will, are often entertaining companions in a fire-side circle. Mr. Holcroft has published the three concluding volumes of "The Adventures of

Hugh

Hugh Trevor;" the dialogues are supported with the same vivacity as in the former, and the sentiments are expressed with the same strength and terseness: nor has Mr. Holcroft's inveteracy against establishments in any degree subsided. "Love at first Sight!"—but five volumes of it are rather too many.—Mrs. Gunning has translated this novel from the French, with additions and alterations: here are plenty of plots, and love-sick lasses without end! Mrs. Gunning's style is easy and natural; and it is acknowledged that some of the characters are singular and striking. "Jocessina," by Isabella Kelly, affords rapes, robberies, and murders, in delightful abundance, with the most charming variety of horrors imaginable! "The Church of St. Siffrit" is a well-written and interesting work, but somewhat diffuse; the former part of this observation will apply to Mrs. Charlton's "Andronica." Two novels have been translated from the French of Diderot, with considerable vivacity, "The Nun," and "James the Fatalist:" in each of these works are some masterly delineations of character, but the pen of Diderot is not remarkable for its chastity. "The Count de Santerre," abounds with high-wrought descriptions, and although the incidents are confused and extravagant, it shows a capability in the "Lady" who wrote it, for a simpler and less exceptionable performance. Among the vast number of novels and romances which "crowd upon our sight," may be selected as a work of instruction and entertainment, "A Gossip's Story and a Legendary Tale:"—"Henry Somerville" is considerably above the ordinary run of novels, and the "Letters of Madame de Montier, collected by Madame Le Prince de Beaumont," have a moral and instructive tendency; they are neatly translated by Miss Newman. "Clara Duplessis and Clairant," is a translation from the German, and like other German productions, is more remarkable for wild and fantastic imagery, than sound sense or moral tendency.

EDUCATION.

The merited celebrity of Dr. Darwin will excite an universal desire to peruse his "Plan for the Conduct of Female Education in Boarding Schools." The doctor's work is written in a plain and perspicuous style; it embraces an extensive variety of objects, connected with the moral and polite accomplishments of young ladies; nor has he neglected to enforce the necessity of philosophical and literary acquirements, to the completion of his pu-

pils. As would naturally be expected, health and corporeal habits are the subject of minute attention. In "Mental Amusement," essays, allegories, and tales, are employed to inculcate humanity and convey instruction. Mr. Lindley Murray's "English Exercises," may fairly be recommended as assisting to the acquisition of an accurate and scientific knowledge of our language. Mr. Browne's "New Classical Dictionary," may be considered as an abridgement of Lempriere's: but this latter surely was sufficiently concise? It is the laudable object of "Dialogues in a Library," to connect the study of natural philosophy with the doctrines of revealed religion; they are written in an easy, intelligible, and amusing manner. A very useful introduction to the study of entomology may be found in "A short History of Insects, extracted from works of credit:" to each order is annexed a plate, containing one specimen of every genus; of which latter, a short account is given, and the most remarkable insects are enumerated, which belong to it. A great number of books are continually publishing, principally by emigrants, as introductions to the study of the French language. The Abbé de Leizac's "Art de parler et d'écrire correctement la Langue Française," is to be selected from the mass, as a work of peculiar merit and utility. The Abbé has unfolded the principles of grammar, in a most critical and scientific manner: he writes a perspicuous style, and displays no common share of taste and discernment.

MISCELLANIES.

Some few publications of considerable merit, are of a nature which could not properly be arranged under any of the preceding heads. Dr. Dawson's "Prolepsis Philologiæ Anglicanæ; or Plan of a Philological and Synonymical Dictionary of the English Language," is an ingenious performance, well meriting attention. As it is quite impossible to convey an adequate idea of the plan which this ingenious philologist in his preliminary pamphlet has laid down to be pursued in the dictionary which he announces, without offering an extract, and entering on the subject more minutely than is consistent with the bird's-eye view of literature which we profess to afford; it is only in our power to state, that the doctor's object is to correct that inaccuracy in the use of terms which confounds our ideas, and is the parent of everlasting disputations, by reducing words as in botany, entomology, and other branches of natural history, to their respective genera and species, and by offering definitions, which

which are at the same time so comprehensive as to include both the idea which any words conveys in *common* with every other of the same part of speech, and that by which it is *distinguished* from all other words; and so precise as to exclude all other ideas which are not essential to it. This plan is so ingenious, and the illustrations of it are so pertinent, that much benefit to the language may be anticipated: the doctor, however, has brought in a theological discussion, which is totally irrelevant to his subject. "The Philanthrope" is evidently the production of a gentleman and a scholar: it is written after the manner of a periodical paper, and embraces a variety of subjects, connected with morals, philosophy, and literature, which are frequently treated in a new and masterly manner.—"The Reporter" is a periodical publication of very considerable merit: of another, entitled "The Friend," we cannot speak in very commendatory terms. "The Investigator" is to be continued monthly! this is easily to be accounted for, on the supposition that the author writes *at the full of the moon*. The "Fragments, in the manner of Sterne," are the most successful imitations of that eccentric author that we remember to have seen: the characters are remarkably well supported, the language is beautiful, and the sentiments are fine. Mr. Dallas's "Miscellanies," are of inferior merit: the story on which he founds his tragedy is not borrowed, he says, from Horace Walpole's "Mysterious Mother;" the similarity, however, is a most unfortunate memento; for the language of "Lucretia," if possible, grows still tamer than it is, by comparing it with the wild and appropriate poetry of Horace Walpole's masterly performance. A most valuable work has been imported from America, Mr. Turnbull's "Visit to the Philadelphia Prison." It appears, that since the reformation of the criminal law in Pennsylvania, which inflicts capital punishment but in one single case, that of cool, deliberate, and artful murder, offences have decreased in the proportion of two-thirds! England, that land of liberty, that seat of science and of arts, of learning, genius, JUSTICE and PHILANTHROPY, England—has on her black and bloody code, more than two hundred crimes which are punishable by death! What the effect has been, may be learned from a perusal of Mr. Colquhoun's Treatise on the Police of the Metropolis. The mention of America brings to our recollection Mr. Rushton's "Expostulatory Letter to George Washington," &c.: this letter is written in a correct and plain style, and was sent to Mr. Washington in a private manner, stating the inconsistency of that gentleman's being, at the same time, the first citizen of a free people, and a SLAVEHOLDER. Mr. Washington returned the letter without condescending to reply; a tacit acknowledgment that the reproach was just. While the Old "Annual Register" crawls in a lazy pace, and seems tottering to its fall, the "New" one, in the fulness of health and the vigour of youth, as the years pass on, walks by their side with an *upright* and untired step. This inspection of the column of Domestic Literature, we trust, has justified the assertion with which we set out, that our countrymen are continually adding to the stability of the fabric, and improving the elegance of its workmanship.

To the Editor of the Monthly Magazine.

SIR,

AS there is not, perhaps, any thing among the writings of the ancients, which has more generally attracted the attention of the literati of every age, than the Atlantic history of Plato, I persuade myself that the following translation, which includes all that is to be found in that *divine philosopher*, on this interesting subject, will be gratefully received by the readers of your Magazine of every description; and to some of them it will, doubtless, be more acceptable than the oracles of the Chaldeans. The whole cannot fail, indeed, to gratify every description of readers; for no more than one single passage, of about 20 or 30 lines, has, prior to my translation of the *Timæus*, appeared in any modern language. Much has been said and written by the moderns, respecting the Atlantic Island, without the extent of the original source being suspected: that source is now, for the first time, exhibited in a popular form.

That the authenticity of the following history should have been questioned by many of the moderns, is by no means surprising, if we consider, that it is the history of an island and people, that are asserted to have existed NINE THOUSAND years prior to Solon; as this contradicts the generally received opinion respecting the antiquity of the world. However, as Plato expressly affirms, that "it is a relation in every respect true *," and as Crantor †, the

* Πανταπασί γε μὴν ἀληθές.

† Ο πρῶτος τοῦ Πλάτωνος ἐξηγητὴς Κραν-
τος. Procl. in Tim. p. 24. et not. — Μαρ-
τύρουσι

the first interpreter of Plato, asserts, "that the following history was said, by the Egyptian priests of his time, to be still preserved, inscribed on pillars," it appears to me, to be at least as well attested as any other narration, in any Greek or Roman historian. Indeed, he who proclaims that "truth is the source of every good, both to gods and men," and the whole of those works consists in detecting error, and exploring certainty, can never be supposed to have wilfully deceived mankind, by publishing an extravagant romance as matter of fact, with all the precision of historical detail.

It is singular, that a narration so novel and interesting, should not, long before this, have been translated into some modern tongue; and it is no less singular, that some learned men should have endeavoured to prove that America is the Atlantic Island of Plato, when, as we shall find, that philosopher asserts, that this island, in the space of one day and night, was absorbed in the sea. That your readers therefore may be fully convinced of the futility of this and many other modern conjectures on the Atlantic history, the following translation from the *Timæus* and *Critias* of Plato (the latter of which was never before published) are recommended to their attentive perusal. I believe I may venture to say, that the version is, on the whole, faithful, however inferior it may be in point of composition to the god-like majesty and elegance of the original. Indeed, I shall not perhaps violate truth, when I assert, that it is impossible to translate such a writer as Plato with equal accuracy and elegance. For who will be hardy enough to affirm the contrary, when he finds that every sentence in Plato, besides the apparent, is pregnant with some weighty concealed meaning, and every word so well chosen, that no other can, with equal propriety, be substituted in its stead. This assertion, will, doubtless, appear paradoxical to many, but he who is in the least acquainted with the profundity of this philosopher's conceptions, will immediately assent to its truth.

Manor-Place,
Walsworth.

Your's, &c.
THO. TAYLOR.

FROM THE *TIMÆUS* OF PLATO

Critias.—Hear, then, Socrates, a discourse surprising, indeed, in the extreme,

τοιοῦτοι δὲ ἢ οἱ προφηταὶ φησὶ τῶν Αἰγυπτίων
ἐν σήλαιν ταῖς ἐπὶ σωζομέναις ταῦτα γεγραφέναι
ἀληθῆς.

yet, in every respect true, as it was once related by Solon, the most wise of the seven wise men. Solon, then, was the familiar and intimate friend of our great grand-father Dropis, as he himself often relates in his poems. But he once declared to our grand-father Critias (as the old man himself informed us), that great and admirable actions had once been achieved by this city, which nevertheless were buried in oblivion through length of time, and the destruction of mankind. In particular he informed me of one undertaking, more illustrious than the rest, which I now think proper to relate to you, both that I may repay my obligations, and that, by such a relation, I may offer my tribute of praise to the goddess in the present solemnity*; by celebrating her divinity, as it were, with hymns, justly, and in a manner agreeably to truth.

Socrates.—You speak well. But what is this ancient achievement, which was not only actually related by Solon, but was once really accomplished by this city?

Critias.—I will acquaint you with that ancient history, which I did not, indeed, receive from a youth, but from a man very much advanced in years: for, at that time, Critias, as he himself declared, was almost ninety years old, and I myself was about ten. When therefore that solemn-

* *i. e.* The lesser Panathenaia. The Athenians had two festivals in honour of Minerva, the former of which, on account of the greater preparation required in its celebration, was called the greater Panathenaia; and the latter, on account of its requiring a less apparatus, was denominated the lesser Panathenaia. The celebration of them was likewise distinguished by longer and shorter periods of time. In the greater Panathenaia too, the veil of the goddess was carried about, in which the giants were represented vanquished by the Olympian gods.—Proclus (in *Tim.* p. 26) informs us, that these festivals signified the beautiful order which proceeds into the world from intellect, and the unconfused distinction of mundane contrarieties. The veil of Minerva is an emblem of that one life or nature of the universe, which, as Proclus observes, the goddess weaves, by those intellectual vital powers which her essence contains, and the battle of the giants against the Olympian gods, signifies the opposition between the last demiurgic powers of the universe (or those powers which partially fabricate and proximately preside over mundane natures) and such as are first. But Minerva is said to have vanquished the giants, because she rules over these ultimate artificers of things by her uniting powers.

nity was celebrated among us, which is known by the name of *Cureotis Apatu-riorum* * nothing was omitted which boys, in that festivity, are accustomed to perform. For when our parents had set before us the rewards proposed for the contest of singing verses, both a multitude of verses of many poets were recited, and many of us especially sung the poems of Solon, because they were at that time entirely new. But then, one of our tribe, whether he was willing to gratify Critias, or whether it was his real opinion, affirmed that Solon appeared to him most wise in other concerns; and, in things respecting poetry, the most ingenious of all poets. Upon hearing this, the old man (for I very well remember) was vehemently delighted; and said, laughing,—‘If Solon, O Amynander! had not engaged in poetry as a casual affair, but had made it, as others do, a serious employment; and if, through seditions and other fluctuations of the state, in which he found his country involved, he had not been compelled to neglect the completion of the history which he brought from Egypt, I do not think that either Hesiod or Homer, or any other poet, would have acquired greater glory and renown.’ In consequence of this, Amynander enquired of Critias what that history was. To which he answered, ‘that it was concerning an affair, the greatest and most celebrated which this city (Athens) ever performed; though, through length of time, and the destruction of those by whom it was undertaken,

the fame of its execution has not reached the present age.’—‘But, I beseech you, Critias (says Amynander), relate this affair from the beginning; and inform me what that event was which Solon asserted as a fact, and on what occasion and from whom he received it.’

‘There is then (says he) a certain region of Egypt called Delta, about the summit of which the streams of the Nile are divided. In this place a government is established, called Saitical; and the chief city of this region of Delta is Sais, from which also king Amasis derived his origin. This city has a presiding divinity, whose name is, in the Egyptian tongue, Neith, and in the Greek, Athena or Minerva. These men were friends of the Athenians, with whom they declared they were familiar, through a certain bond of alliance. In this country Solon, on his arrival thither, was, as he himself relates, very honourably received: and, upon his enquiring about ancient affairs of those priests who possessed a knowledge in such particulars superior to others, he perceived that neither himself, nor any one of the Greeks (as he himself declared), had any knowledge of very remote antiquity. Hence, when he was desired to excite them to the relation of ancient transactions, he, for this purpose, began to discourse about those most ancient events which formerly happened among us; I mean the traditions concerning the first Phoroneus and Niobe, and, after the deluge of Deucalion and Pyrrha, as described by the Mythologists, together with their posterity; at the same time paying a proper attention to the different ages in which these events are said to have subsisted.

‘But, upon this, one of those more ancient priests exclaimed, “O Solon! Solon! you Greeks are always children, nor is there any such a thing as an aged Grecian among you.” But Solon, when he heard this; “What (says he) is the motive of your exclamation?” To whom the priest, —“Because all your souls are juvenile; neither containing any ancient opinion derived from remote tradition, nor any discipline hoary from its existence in former periods of time. But the reason of this is the multitude and variety of destructions of the human race, which formerly have been, and again will be: the greatest of these, indeed, arising from fire and water; but the lesser from ten thousand other contingencies. For the relation subsisting among you, that Phaëton

* The *Apataria*, according to Proclus and Suidas, were festivals in honour of Bacchus, which were publicly celebrated for the space of three days. And they were assigned this name, *ἡ ἀπατην*, that is, on account of the deception through which Neptune is reported to have vanquished Xanthus. The first day of these festivals was called *δορπεία*, in which, as the name indicates, those of the same tribe feasted together; and hence (says Proclus) on this day, *εὐωχίαι καὶ δεπνὰ πολλὰ*, splendid banquets and much feasting took place. The second day was called *ἀναρρυσίς*, a sacrifice, because many victims were sacrificed in it; and hence the victims were called *ἀναρρυσμῆτα*, because *εὐρυμένα ἀπὸ δρυὸς*, they were drawn upwards, and sacrificed. The third day, of which Plato speaks in this place, was called *κουργεωτής*, because on this day *κουργοί*, that is, boys or girls, were collected together in tribes, with their hair shorn. And to this some add a fourth day, which they call *ἐπιθεῖα*, or the day after. Proclus farther informs us, that the boys who were collected on the third day were about three or four years old.

the offspring of the sun, on a certain time, attempted to drive the chariot of his father, and not being able to keep the track observed by his parent, burned up the natures belonging to the earth, and perished himself, blasted by thunder—is, indeed, considered as fabulous, yet is in reality true *. For it expresses the mutation of the bodies revolving in the heavens about the earth; and indicates that through long periods of time, a destruction of terrestrial natures ensues from the devastations of fire. Hence those who either dwell on mountains, or in lofty and dry places, perish more abundantly than those who dwell near rivers, or on the borders of the sea. To us, indeed, the Nile is both salutary in other respects, and liberates us from the fear of such-like depredations. But when the gods, purifying the earth by waters, deluge its surface, then the herdsmen and shepherds inhabiting the mountains, are preserved, while the inhabitants of your cities are hurried away to the sea, by the impetuous inundation of the rivers. On the contrary, in our region, neither then nor at any other time, did the waters, descending from on high, pour with desolation on the plains, but they are naturally impelled upwards from the bosom of the earth. And from these causes

* The following explanation is given by the Platonic philosophy of the well-known fable of Phaëton:—Phaëton signifies a comet, by which considerable parts of the earth are at times destroyed. But he is said to be the offspring of the sun, because a comet, according to the Platonists, is a sublunary body, consisting of a collection of dry vapours, raised and set on fire by the sun. He is likewise said to have desired the government of his father's chariot, because a comet strives to imitate the circular motion of the sun. He did not keep the track observed by his parent, because a comet does not move in a direction parallel to that of the sun. He was blasted by thunder, through the anger of Jupiter, because this comet was extinguished by moist vapours. On this account, he is said to have fallen into the river Eridanus, because the comet was extinguished through moisture. He was lamented by the Heliades, because the vapour proceeding from the dissolution of the comet flowed downwards, being of a watery nature, and in this respect corresponding to tears. The Heliades were changed into poplar-trees, because a juice distils from the poplar-tree similar to amber; and amber has a golden splendour; and gold is dedicated to the sun. The fable therefore obscurely signifies that the juice of the poplar-tree is produced by moisture, similar to that which was produced by the dissolution of the comet.

the most ancient traditions are preserved in our country. For, indeed, it may be truly asserted, that in those places where neither intense cold nor immoderate heat prevails, the race of mankind is always preserved, though sometimes the number of individuals is increased, and sometimes suffers a considerable diminution. But whatever has been transacted, either by us or by you, or in any other place, beautiful or great, or containing any thing uncommon, of which we have heard the report, every thing of this kind is to be found described in our temples, and preserved to the present day. While, on the contrary, you and other nations commit only recent transactions to writing, and to other inventions which society has employed for transmitting information to posterity; and so again, at stated periods of time, a certain celestial deluxion rushes on them like a disease, from whence those among you who survive, are both destitute of literary acquisitions and the inspirations of the muses. Hence you become juvenile again, and ignorant of the events which happened in ancient times, as well among us as in the regions which you inhabit.

“The transactions, therefore, O Solon, which you relate from your antiquities, differ very little from puerile fables. For, in the first place, you only mention one deluge of the earth, when, at the same time, many have happened. And, in the next place, you are ignorant of a most illustrious and excellent race of men, who once inhabited your country; from whence you and your whole city descended, though a small seed only of this admirable people once remained. But your ignorance in this affair is owing to the posterity of this people, who were for many ages deprived of the use of letters, and became, as it were, dumb. For prior, O Solon, to that mighty deluge which we have just mentioned, a city of Athenians existed, informed according to the best laws, both in military concerns and every other duty of life; and whose illustrious actions and civil institutions are celebrated by us as the most excellent of all that have existed under the ample circumference of the heavens.”

“Solon, therefore, upon hearing this, said that he was astonished; and, burning with a most ardent desire, entreated the priests to relate accurately all the actions of his ancient fellow-citizens: that afterwards one of the priests replied:—“Nothing of envy, O Solon, prohibits us from

from complying with your request; but, for your sake and that of your city, I will relate the whole; and especially on account of that goddess* who is allotted the guardianship both of your city and our's, and by whom they have been educated and founded; your's, indeed, by a priority to our's of a thousand years, receiving the seed of your race from Vulcan and the earth. *But the description of the transactions of this our city, during the space of EIGHT THOUSAND YEARS, is preserved in our sacred writings.* I will therefore cursorily run over the laws and more illustrious actions of those cities which existed nine thousand years ago. For when we are more at leisure, we shall prosecute an exact history of every particular, receiving, for this purpose, the sacred writings themselves.

"In the first place then, consider the laws of these people, and compare them with our's; for you will find many things which then subsisted in your city, similar to such as exist at present. For the priests passed their life separated from all others. The artificers also exercised their arts in such a manner, that each was engaged in his own employment, without being mingled with other artificers. The same method was likewise adopted with shepherds, hunters, and husbandmen. The soldiers, too, you will find, were separated from other kind of men, and were commanded by the laws to engage in nothing but warlike affairs. A similar armour too, such as that of shields and darts, was employed by each. These we first used in Asia; the goddess in those places, as likewise happened to you, first pointing them out to our use. You may perceive too from the beginning, what great attention was paid by the laws to prudence and modesty; and, besides this, to divination and medicine, as subservient to the preservation of health. And from these, which are divine goods, the laws, proceeding to the invention of such as are merely human, procured all such other disciplines as follow from those we have just enumerated.

"From such a distribution, therefore, and in such order, the goddess first established and adorned your city, choosing, for this purpose, the place in which you were born; as she foresaw that from the excellent temperature of the region, men would arise, distinguished by the most consummate sagacity and wit. For as the goddess is a lover both of wisdom

and war*, she fixed on a soil capable of producing men the most similar to herself, and rendered in every respect adapted for the habitation of such a race. The ancient Athenians, therefore, using these laws, and being formed by good institutions, in a still higher degree than I have mentioned, inhabited this region: surpassing all men in every virtue, as it becomes those to do who are the progeny and pupils of the gods.

"But though many and mighty deeds of your city are contained in our sacred writings, and are admired as they deserve, yet there is one transaction which surpasses all of them in magnitude and virtue. For these writings relate what prodigious strength your city formerly tamed, when a mighty warlike power, rushing from the Atlantic sea, spread itself with hostile fury over all Europe and Asia: for, at that time, the Atlantic sea was navigable, and had an island † before

* *Minerva* was called by the ancients, the *philosophic* goddess, because she is replete with intellectual knowledge, and the light of wisdom; and *philopolemic*, or a lover of contention, because she uniformly rules over the opposing natures which the world contains.

† In addition to what we have already said in proof that Plato's account of the Atlantic Island is not a fiction of his own devising, let the reader attend to the following relation of one Marcellus, who, according to Proclus (a), wrote a history of Æthiopian affairs. Οτι μιν εγενετο τοιαυτη τις νησος και τηλικαυτη, εηλουσι τινες των ισθρουλων τα περι της εξω θαλασσης. ειναι γαρ και εν τοις αυτων χρονοις επλα μιν νησος εν εκεινω τω πελαγει περιεφυνης ιερης, τρις δε αλλας απλητους, την μιν πλουσιαν, την δε αμνην, μισην δε τουτων αλλην ποσειδωνος, χιλων σταδιων το μεγαθος. και τους οικουστας εν αυτη μηνην απο των προγονων διασωζειν περι της αλγανιδος οντως γενομενης εκει νησου παμμεγαλειας, ην επι πολλας περιόδους δυνασσειν πασων των εν ατλαντικω πελαγει νησων. ταυτα μιν ευν ο Μαρκελλος εν τοις αιθιοπικοις γεγραπεν. i. e. "That such and so great an island once existed, is evinced by those who have composed histories of things relative to the external sea. For they relate that in their times there were seven islands in the Atlantic Sea, sacred to Proserpine; and besides these, three of an immense magnitude; one of which was sacred to Pluto, another to Ammon, and another, which is the middle of these, and is of a thousand stadia, to Neptune. And besides this, that the inhabitants of this last island preserved the memory of the prodigious magnitude of the Atlantic island, as related by their ancestors; and of its governing for many periods all the islands of the Atlantic sea. And such is the relation of Marcellus, in his Æthiopic history."

(a) In Tim. p. 55.

Indeed

before that mouth which is called by you the Pillars of Hercules. But this island was greater than both Lybia and all Asia together, and afforded an easy passage to other neighbouring islands; as it was likewise easy to pass from those islands to all the continent, which borders on this Atlantic Sea. For the waters which are beheld within the mouth we just now mentioned, have the form of a bay with a narrow entrance: but the mouth itself is a true sea. And, lastly, the earth which surrounds it is in every respect truly denominated the continent.

“In this Atlantic island a combination of kings was formed, who with mighty

Indeed, it is not at all wonderful that so large an island should once have existed, nor improbable that many more such exist at present, though to us unknown, if we admit the Platonic hypothesis, that the true surface or summit of the earth is ethereal; that this summit is every where perforated with holes; and that we reside at the bottom of four of those holes, which we denominate the four quarters of the globe. This hypothesis is of Egyptian origin, is largely unfolded by Plato towards the end of the *Phædo*; and is rendered highly probable by the following extraordinary passage from Proclus (a); “Plato does not measure the magnitude of the earth after the manner of mathematicians; but thinks that its interval is much greater, as Socrates asserts in the *Phædo*. For, indeed, if the earth be naturally spherical, it is necessary that it should be such according to its greatest part. But the parts which we inhabit, both internally and externally exhibit great inequality. In some parts of the earth, therefore, there must be an expanded plain, and an interval extended on high. For according to the saying of Heraclitus, he who passes through a very profound region will arrive at the Atlantic mountain, whose magnitude is such, according to the relation of the *Æthiopian* historians, that it touches the æther, and casts a shadow of five thousand stadia (625 miles) in extent; for from the ninth hour of the day the sun is concealed by it, even to his perfect demerion under the earth. Nor is this wonderful: for Athos, a Macedonian mountain, casts a shadow as far as to Lemnos, which is distant from it seven hundred stadia (upwards of 87 miles). Nor are such particulars as these, which Marcellus, the *Æthiopic* historian, mentions, related only concerning the Atlantic mountain, but Ptolemy also says that the Lunar mountains are of an immense height; and Aristotle, that Caucasus is enlightened by the rays of the sun a third part of the night after sun-set, and a third part before the rising of the sun. And if any one considers the whole magnitude of the earth, bounded by its elevated parts, he will conclude that it is truly of a prodigious magnitude, according to the assertion of Plato.”

(a) In *Tim.* p. 56.

and wonderful power subdued the whole island, together with many other islands and parts of the continent; and besides this, subjected to their dominion all Lybia, as far as to Egypt; and Europe, as far as to the Tyrrhene Sea. And when they were collected in a powerful league, they endeavoured to enslave all our region and your's, and besides this all those places situated within the mouth of the Atlantic Sea. Then it was, O Solon, that the power of your city was conspicuous to all men for its virtue and strength. For as its armies surpassed all others, both in magnanimity and military skill, so with respect to its contests, whether it was assisted by the rest of the Greeks, over whom it presided in warlike affairs, or whether it was deserted by them through the incursions of the enemies, and became situated in extreme danger, yet still it remained triumphant. In the mean time, those who were not yet enslaved, it liberated from danger, and procured the most ample liberty for all those of us who dwell within the Pillars of Hercules. But, in succeeding time, prodigious earthquakes and deluges taking place, and bringing with them desolation, in the space of one day and night, all that warlike race of Athenians was at once merged under the earth; and the Atlantic Island itself, being absorbed in the sea, entirely disappeared. *And hence that sea is at present innavigable, arising from the gradually impeding mud which the subsiding island produced.*” And this, Socrates, is the sum of what the elder Critias repeated from the narration of Solon.

FROM THE CRITIAS OF PLATO.

Critias. If then we can sufficiently remember and relate the narration which was once given by the Egyptian priests, and brought hither by Solon, you know that we shall appear to this theatre, to have sufficiently accomplished our part. This, therefore, must now be done, and without any farther delay.

But first of all, we must recollect, that the period of time from which a war is said to have subsisted between all those that dwelt beyond and within the Pillars of Hercules, amounts to NINE THOUSAND YEARS: and this war it is now requisite for us to discuss. Of those, therefore, that dwelt within the Pillars of Hercules, this city was the leader, and is said to have fought in every battle; but of those beyond the Pillars, the kings of the Atlantic island were the leaders. But

But this island, we said, was once larger than Lybia and Asia, *but is now a mass of impervious mud, through concussions of the earth; so that those who are sailing in the vast sea, can no longer find a passage from hence thither.* The course of our narration, indeed, will unfold the many barbarous nations and Grecian tribes which then existed, as they may happen to present themselves to our view: but it is necessary to relate, in the first place, the wars of the Athenians, and their adversaries, together with the power and the politics of each. And in discoursing of these, we shall give the preference to our own people.

The gods then, once were locally allotted * the whole earth, but not with contention: for it would be absurd that the gods should be ignorant of what is adapted to every one, or that knowing that which rather belongs to others, they should endeavour, through strife, to possess that which is not their own. Likewise receiving places agreeable to them, from the allotments of justice, they inhabited the various regions of the earth. In consequence of this too, like shepherds, they nourished us as their possessions, flocks, and herds; with this exception, however, that they did not force bodies to bodies, in the same manner as shepherds, who, when feeding their cattle, compel them to come together with blows: but they considered us as a docile and obedient animal; and, as if piloting a pliant ship, employed persuasion for the rudder; and with this conception as the leader, they governed the whole mortal race. Different gods, therefore, being allotted, adorned different places. But Vulcan and Minerva †, who possess a common nature, both because they are the offspring of the same father, and because, through philosophy and the study of arts, they tend to the same things; these, I say, in consequence of this, received one allotment, viz. this region, as being naturally allied and adapted to virtue and prudence. But these divinities having produced worthy earth-born men, arranged in their intellectual part the order of a policy. Of these men, the names are preserved, but their works, through the extinction of those that received them, and length of time, have disappeared. For the sur-

viving race of men, as has been observed before, are always mountaineers, and void of discipline, who have only heard the names of men that were powerful in the region, and who, besides this, have been acquainted but with few of the transactions of the country. In consequence, therefore, of loving those ancient men, they gave the names of them to their children; but they were ignorant of the virtues and laws of those before them; for of these they knew nothing but what they gathered from certain obscure rumors. But as for many generations they were in want of necessities, both they and their children directed their attention to the particulars of which they were destitute, discoursed about these, and neglected past and ancient transactions. For mythology, and an investigation of ancient affairs, commence in cities, in conjunction with leisure, when the necessities of life are procured, but not before. On this account the names of ancient transactions were preserved, without any account of the transactions themselves. But I infer that this was the case (said Solon) because those priests, in their narration of the war at that period, inserted many names similar to those that were adopted afterwards, such as Cecrops, Erectheus, Erichthonius, Erichthon, and many other of those names, which are commemorated prior to Theseus. This was likewise the case with the names of the women. The figure too, and statue of Minerva, evinced, that at that period the studies of women and men with respect to war were common, as an armed image was then dedicated to the goddess; this serving as a document, that, among animals of the same species, both male and female are naturally able to pursue, in common, every virtue which is adapted to their species. But, at that time, many other tribes of citizens dwelt in this region, who were skilled in the fabricative arts, and in agriculture. The warlike tribe, however, lived from the first separate from divine men, and possessed every thing requisite to aliment and education. None of them, however, had any private property; for all of them considered all things as common. They likewise did not think it worth while to receive from other citizens beyond a sufficiency of nutriment; and they engaged in all those pursuits, which we related yesterday as pertaining to the guardians of our republic. It was likewise plausibly and truly said of our region, that, in the first place, at that time its boundaries extended,

* For a copious account of divine allotments, see my notes to Pausanias, vol. iii. p. 259, &c.

† For an account of these divinities, see also my notes to Pausanias.

extended, on one side to the Isthmus, and on the other to the Epirus, as far as to Cithæron and Parnethè. These boundaries are on the descent, having Oropia on the right hand, and limiting Alopus, towards the sea, on the left. It is likewise said that the whole earth was vanquished by the valour of this region; and that on this account it was at that time able to support the numerous army, formed from the surrounding inhabitants. But this, it is said, was a mighty proof of virtue. For what is now left of this country, may contend with any other in fertility of soil, in the goodness of its fruits, and in pastures accommodated to every species of animals. But then it produced all these, not only thus beautiful, but likewise in the greatest abundance. But how is this credible? and by what arguments can it be shown that these are the remains of the land that then existed? The whole of this region is situated like a long promontory, extending into the sea, from the other continent. This the profound receptacle of the sea every way surrounds. *As, therefore, many and mighty deluges happened in that period of nine thousand years (for so many years have elapsed from that to the present time)* the defluxions of the earth at these times, and during these calamities, from elevated places, did not, as they are elsewhere wont to do, accumulate any hillock which deserves to be mentioned, but always flowing in a circle, at length vanished in a profundity. The parts, therefore, that are left at present, are but as small islands, if compared with those that existed at that time, and may be said to resemble the bones of a diseased body; such of the earth as was soft and fat being washed away, and a thin body of the country alone remaining. But at that time the land being unmingled, contained mountains and lofty hills; the plains, which are now denominated Pheliei, were then full of fat earth; and the mountains abounded with woods, of which there are evident tokens even at present. For there are mountains which now only afford nutriment for bees, but formerly, and at no very distant period, the largest trees were cut down from those mountains, as being adapted for buildings; and of these edifices the coverings still remain. There were likewise many other domestic trees, and most fertile pastures for cattle. This region too, every year enjoyed prolific rain, which did not then as now run from naked earth into the sea, but, being collected in great abund-

ance from lofty places, and preserved for use in certain cavities of the earth, diffused copious streams of fountains and rivers to every part of the country; the truth of which is confirmed by certain sacred remains which are still to be seen in the ancient fountains. And such was the natural condition of this region formerly: besides which, it was cultivated, as it was reasonable to suppose it would be, by real husbandmen, who were men of elegant manners, and of a disposition naturally good; who possessed a most excellent soil, most abundant streams of water, and a most salubrious temperament of air.

But the city at that time was built in the following manner: In the first place, the Acropolis was not then as it is at present: for now one rainy night, having softened the bare land round about, in a remarkable degree, at the same time produced an earthquake; *and thus there happened a third fatal inundation of water, prior to the deluge of Deucalion.* But prior to this, the magnitude of the Acropolis extended as far as to Eridanus and Ilissus, comprehended within itself Pnyx and Lycabætus, and was bounded in a direction opposite to Pnyx. All the land too was glebous, except a few places in a more elevated situation, which were plain. Its exterior parts, on the left hand, were inhabited by artists and husbandmen, who cultivated the neighbouring land. But the warlike tribe alone inhabited the elevated parts, about the temple of Minerva and Vulcan, being distributed in one inclosure round the garden, as it were of one edifice. For those who raised public buildings and common banquets, for the winter season, together with whatever is adapted to a common polity, and who furnished both these, and temples themselves, without gold and silver—all of this description dwelt in the northern parts of this region. For gold and silver were not employed by any one at any time; but pursuing a middle course between arrogance and illiberality, they built moderate houses, in which both they and the offspring of their offspring growing old, they always left them to others like themselves. But in summer they used gardens, gymnasia, and public banquets, in places situated towards the south. There was likewise one fountain in the place where the Acropolis is now situated, which having been exhausted by earthquakes, small circulating streams alone remain at present. But at that time every part was abundantly

abundantly supplied with springs of water, which were of a salutary temperament, both in summer and winter. In this manner then these places were formerly inhabited; and the men, of whom we have been speaking, were guardians of their own citizens, but leaders of the other willing Greeks. They likewise were especially careful that there might always be the same number of men and women, who by their age are able to fight, and that this number might not be less than twenty thousand. These men, therefore, being such as we have described, and always justly administering in this manner both their own affairs and those of all Greece, they were esteemed and renowned beyond every other nation, by all Europe and Asia, both for the beauty of their bodies, and the all-various virtue of their souls.

In the next place, I shall communicate to you, from the beginning, the particulars respecting the adversaries of these men, if I am able to recollect what I heard when I was a boy. But somewhat prior to this narration it is proper to observe, that you must not be surprized at often hearing me mention Grecian names of barbarous men. For the cause of this is as follows: Solon intending to insert this narration in his verses, investigated for this purpose the power of names, and found that those first Egyptians, who committed these particulars to writing, transferred these names into their own tongue. He, therefore, again receiving the meaning of every name, introduced that meaning into our language. And these writings were in the possession of my grandfather, and are now in mine: they were likewise the subject of my meditation while I was a boy. If, therefore, in the course of this narration you hear such names as subsist among us at present you must not be surprized; for you know the cause. But it will require a long discourse to speak from the beginning, as I did before, concerning the allotments of the gods, and to shew how they distributed the whole earth; here into larger, and there into lesser allotments, and procured temples and sacrifices for themselves. Neptune, indeed, being allotted the Atlantic island, settled his offspring, by a mortal woman, in a certain part of the island, of the following description: Towards the sea, but in the middle of the island, there was a plain, which is said to have been the most beautiful of

all plains, and distinguished by the fertility of the soil. Near this plain, and again in the middle of it, at the distance of fifty stadia, there was a very low mountain. This was inhabited by one of those men, who in the beginning sprung from the earth, and whose name was Evenor. This man living with a woman called Leucippe, had by her Clites, who was his only daughter. But when the virgin arrived at maturity, and her father and mother were dead, Neptune*, being captivated with her beauty, had connection with her, and enclosed the hill on which she dwelt with spiral streams of water; the sea and the land, at the same time, alternately forming about each other lesser and larger zones. Of these, two were formed by the land, and three by the sea: and these zones, as if made by a turner's wheel, were in all parts equi-distant from the middle of the island; so that the hill was inaccessible to men. For at that time there were no ships, and the art of sailing was then unknown. But Neptune, as being a divinity, easily adorned the island in the middle; caused two fountains of water to spring up from under the earth, one cold and the other hot, and likewise bestowed all various and sufficient aliment from the earth. He also begat and educated five births of male twins; and having distributed all the Atlantic island into ten parts, he bestowed upon his first-born son his maternal habitation, and the surrounding land; this being the largest and the best division. He likewise established this son king of the whole island, and made the rest of his sons governors. But he gave to each of them dominion over many people, and an extended tract of land. Besides this too, he gave all of them names. And his first-born son, indeed, who was the king of all the rest,

* Every god, according to the Platonic theology, beginning from on high, produces his proper series as far as to the last of things, and this series comprehends many essences different from each other, such as *angelical*, *dæmoniack*, *heroical*, *nymphical*, and the like. The lowest powers of these orders have a great communion and physical sympathy with the human race, and contribute to the perfection of all their natural operations, and particularly to their procreations. Hence a dæmoniack Neptune, by contributing to the procreation of the offspring of Clites, is, in mythological language, said to have been captivated with her beauty, and to have had connection with her.

he called Atlas, whence the whole island was at that time denominated Atlantic. But the twin son that was born immediately after Atlas, and who was allotted the extreme parts of the island, towards the pillars of Hercules, as far as to the region, which at present, from that place, is called Gadirc, he denominated according to his native tongue Gadirus, but which we call in Greek Eumelus. Of his second twin offspring, he called one Ampheres, and the other Eudæmon. The first-born of his third offspring he denominated Mneseus, and the second Autochthon. The elder of his fourth issue he called Elapippus, and the younger Mestor. And, lastly, he denominated the first-born of his fifth issue Azaes, and the second Diaprepes. All these and their progeny dwelt in this place for a prodigious number of generations, ruling over many other islands, and extending their empire, as we have said before, as far as to Egypt and Tyrrhenia. But the race of Atlas was by far the most honourable; and of these, the oldest king always left the kingdom, for many generations, to the eldest of his offspring. These too possessed wealth in such abundance as to surpass, in this respect, all the kings that were prior to them; nor will any that may succeed them easily obtain the like. They had likewise every thing provided for them, which, both in a city and every other place, is sought after as useful for the purposes of life. And they were supplied indeed with many things from foreign countries, on account of their extensive empire, but the island afforded them the greater part of every thing of which they stood in need. In the first place, the island supplied them with such things as are dug out of mines in a solid state, and with such as are melted; and Orichalcum, which is now but seldom mentioned, but then was much celebrated, was dug out of the earth in many parts of the island, and was considered as the most honourable of all metals except gold. Whatever too the woods afford for builders the island produced in abundance. There were likewise sufficient pastures there for tame and savage animals; together with a prodigious number of elephants. For there were pastures for all such animals as are fed in lakes and rivers, on mountains and in plains. And in like manner there was sufficient aliment for the largest and most voracious kind of animals. Besides this, whatever of odoriferous the earth nourishes at present, whether roots or

grafs, or wood, or juices, or gums, flowers, or fruits—these the island produced, and produced them well. Again, the island bore mild and dry fruits, such as we use for food, and of which we make bread (aliment of this kind being denominated by us leguminous), together with such meats, drinks, and ointments, as trees afford. Here likewise there were trees, whose fruits are used for the sake of sport and pleasure, and which it is difficult to conceal; together with such dainties as are used as the remedies of satiety, and are grateful to the weary. All these an island, which once existed, bore sacred, beautiful, and wonderful, and in infinite abundance. The inhabitants too, receiving all these from the earth, constructed temples, royal habitations, ports, docks, and all the rest of the region, disposing them in the following manner:

In the first place, those who resided about the ancient metropolis, united by bridges those zones of the sea, which we before mentioned, and made a road both to the external parts and to the royal abode. But the palace of the king was from the first immediately raised, in this very habitation of the god, and their ancestors. This being adorned by one person after another in continued succession, the latter of each always surpassing the former in the ornaments he bestowed, the palace became at length astonishingly large and beautiful. For they dug a trench as far as to the outermost zone, which commencing from the sea, extended three acres in breadth, and fifty stadia in length. And that ships might sail from this sea to that zone as a port, they enlarged its mouth, so that it might be sufficient to receive the largest vessels. They likewise divided, by bridges, those zones of the earth which separated the zones of the sea, so that, with one three-banked galley, they might sail from one zone to the other; and covered the upper part of the zones in such a manner that they might sail under them. For the lips of the zones of earth were higher than the sea. But the greatest of these zones, towards which the sea directed its course, was in breadth three stadia: the next in order was of the same dimension. But of the other two, the watery circle was in breadth two stadia; and that of earth was again equal to the preceding circle of water: but the zone, which ran round the island in the middle, was one stadium in breadth. The island which contained the palace of the king

was five stadia in diameter. This, together with the zones and the bridge, which was every way an acre in breadth, they enclosed with a wall of stone, and raised towers and gates on the bridges, according to the course of the sea. Stones too were dug out from under the island, on all sides of it, and from within and without the zones; some of which were white, others black, and others red: and these stone quarries, on account of the cavity of the rock, afforded two convenient docks. With respect to the edifices, some were of a simple structure, and others were raised from stones of different colours; thus by variety pursuing pleasure, which was allied to their nature. They likewise covered the superficies of the wall, which enclosed the most outward zone, with brass, using it for this purpose as an ointment: but they covered the superficies of that wall which enclosed the interior zone with tin: and, lastly, they covered that which enclosed the metropolis with orichalcum, which shines with a fiery splendor.

But the royal palace within the acropolis, was constructed as follows: in the middle of it, there was an inaccessible temple sacred to Clites and Neptune, and which was surrounded with an enclosure of gold. In this place, assembling in the beginning, they produced the genus of ten kings: and from the ten divisions of the whole region, here collected every year, they performed seasonable sacrifices to each. But the temple of Neptune was one stadium in length, and three acres in breadth; and its altitude was commensurable to its length and breadth. But there was something Barbaric in its form. All the external parts of the temple, except the summit, were covered with silver: for that was covered with gold. With respect to the internal parts, the roof was entirely formed from ivory, variegated with gold, silver, and orichalcum: but as to all the other parts, such as the walls, pillars, and pavement, these were adorned with orichalcum. Golden statues too were placed in the temple: and the god himself was represented standing on a chariot, and governing six winged horses; while at the same time, through his magnitude, he touched the roof with his head. An hundred Nereids upon dolphins were circularly disposed about him; for at that time this was supposed to be the number of the Nereids. There were likewise many other statues of private persons, dedicated within the tem-

ple. Round the temple, on the outside, stood golden images of all the women and men that had descended from the ten kings; together with many other statues of kings and private persons, which had been dedicated from the city, and from foreign parts, that were in subjection to the Atlantic island. There was an altar too, which accorded in magnitude and construction with the other ornaments of the temple: and in like manner the palace was adapted to the magnitude of the empire, and the decorations of the sacred concerns. The inhabitants likewise used fountains both of hot and cold water, whose streams were copious, and naturally salubrious and pleasant in a wonderful degree. About the fountains too edifices were constructed, and trees planted, adapted to these fontal waters. Receptacles of water likewise were placed round the fountains, some of which were exposed to the open air, but others were covered, as containing hot baths for the winter season. Of these receptacles some were appropriated to the royal family, and others, apart from these, to private individuals: and, again, some were set apart for women, and others for horses, and other animals of the yoke; a proper ornament at the same time being distributed to each. They likewise brought defluent streams to the grove of Neptune, together with all-various trees, of an admirable beauty and height, through the profundity of the soil: and thence they derived these streams to the exterior circles, by conducting them through channels over the bridges. But in each island of these exterior circles, there were many temples of many gods, together with many gardens and gymnasia, apart from each other, some for men, and others for horses. But about the middle of the largest of the islands, there was a principal hippodrome, which was a stadium in breadth, and the length of which extended round the whole circle, for the purpose of exercising the horses. On all sides of the hippodrome stood the dwellings of the officers of the guards. But the defence of the place was committed to the more faithful soldiers, who dwelt in the smaller circle, and before the acropolis: but the most faithful of all the soldiers were assigned habitations within the acropolis, and round the royal abodes. The docks likewise were full of three-banked galleys, and of such apparatus as is adapted to vessels of this kind. And in this manner the parts about the royal

royal palaces were disposed. But having passed beyond the external ports, which were three in number, a circular wall presented itself to the view, beginning from the sea, and every way distant from the greatest of the circles and the port, by an interval of fifty stadia. This wall terminated in the mouth of the trench which was towards the sea. The whole space too enclosed by the wall, was crowded with houses: and the bay and the greatest harbour were full of ships and merchants, that came from all parts. Hence, through the great multitude that were here assembled, there was an all-
various clamor and tumult, both by day and night. And thus we have nearly related the particulars respecting the city, and the ancient habitation, as they were then unfolded by the Egyptian priests. In the next place we shall endeavour to relate what was the nature, and what the arrangement of the rest of the region.

First then, every place is said to have been very elevated and abrupt which was situated near the sea: but all the land round the city was a plain, which circularly invested the city, but was itself circularly enclosed by mountains, which extended as far as to the sea. This plain too was smooth and equable: and its whole length, from one side to the other, was three thousand stadia; but according to its middle, from the sea upwards, it was two thousand stadia. The whole island likewise was situated towards the south, but from its extremities was exposed to the north. Its mountains were then celebrated as surpassing all that exist at present, in multitude, magnitude, and beauty; and contained many villages, whose inhabitants were wealthy. Here too there were rivers, lakes, and meadows, which afforded sufficient nutriment for all tame and savage animals; together with woods, various both in multitude and kind, and in abundance adequate to the several purposes to which they are subservient. This plain, therefore, both by nature, and the labours of many kings in a long period of time, was replete with fertility. Its figure too was that of a square, for the most part straight and long; but, on account of the trench which was dug round it, it was deficient in straightness. The depth, breadth, and length of this trench are incredible, when compared with other labours accomplished by the hands of men: but, at the same time, we must relate what we have heard. Its depth was one acre, and its breadth every where a

stadium. And as it was dug round the whole plain, its length was consequently ten thousand stadia*. This trench received the streams falling from the mountains, and which circularly flowing round the plain towards the city, and being collected from different parts, at length poured themselves from the trench into the sea. Ditches one hundred feet in breadth being cut in a right line from this part, were again sent through the plain into the trench near the sea. But these were separated from each other by an interval of one hundred stadia. The inhabitants brought wood to the city from the mountains, and other seasonable articles, in twofold vessels, through the trenches: for the trenches intersected with each other obliquely, and towards the city. Every year too they twice collected the fruits of the earth; in winter using the waters from Jupiter, and in summer bringing the productions of the earth through the streams deduced from the trenches. With respect to the multitude of men in the plain, useful for the purposes of war, it was ordered that a commander in chief should be taken out of each allotment. But the magnitude of each allotted portion of land was ten times ten stadia: and the number of all the allotments was sixty thousand. There is said to have been an infinite number of men from the mountains and the rest of the region; and all of them were distributed according to places and villages into these allotments, under their respective leaders. The commander in chief, therefore, of each division, was ordered to bring into the field of battle a sixth part of the war chariots, the whole amount of which was ten thousand, together with two horses and two charioteers: and again, it was decreed that he should bring two horses yoked by the side of each other, but without a seat, together with a man who might descend, armed with a small shield, and who, after the charioteer, might govern the two horses: likewise that he should bring two heavy-armed soldiers, two slingers, three light-armed soldiers, three hurlers of stones, and three jaculators, together with four sailors, in order to fill up the number of men sufficient for one thousand two hundred ships. And in this manner were the warlike affairs of the royal city disposed. But

* That is 1250 miles. This trench, however, was not a more surprising effort of human industry than is the present wall of China.

those of the other nine cities were disposed in a different manner, which it would require a long time to relate. But the particulars respecting the governors were instituted from the beginning, as follows. Each of the ten kings possessed absolute authority both over the men, and the greater part of the laws in his own division, and in his own city, punishing and putting to death whomsoever he pleased. But the government and communion of these kings with each other, were conformable to the mandates given by Neptune; and this was likewise the case with their laws. These mandates were delivered to them by their ancestors, inscribed on a pillar of orichalcum, which was erected about the middle of the island, in the temple of Neptune. These kings, therefore, assembled together every fifth, and alternately every sixth year, for the purpose of distributing an equal part both to the even and the odd. But when assembled, they deliberated on the public affairs, enquired if any one had acted improperly, and if he had, called him to account for his conduct. But when they were about to sit in judgment on any one, they bound each other by the following compact. As, prior to this judicial process, there were bulls in the temple of Neptune, free from all restraint, they selected ten of these, and vowed to the god they would offer a sacrifice which should be acceptable to him, viz. a victim taken without iron, and hunted with clubs and snares. Hence whatever bull was caught by them they led to the pillar, and cut its throat on the summit of the column, agreeably to the written mandates. But on the pillar, besides the laws, there was an oath, supplicating mighty imprecations against those that were disobedient. When, therefore, sacrificing according to their laws, they began to burn all the members of the bull, they poured out of a full bowl a quantity of clotted blood for each of them, and gave the rest to the fire; at the same time lustrating the pillar. After this, drawing out of the bowl in golden cups, and making a libation in the fire, they took an oath that they would judge according to the laws inscribed on the pillar, and would punish any one who prior to this should be found guilty; and likewise that they would never willingly transgress any one of the written mandates. They added, that they would neither govern, nor be obedient to any

one who governed, contrary to the prescribed laws of their country. When every one had thus supplicated both for himself and those of his race, after he had drank, and had dedicated the golden cup to the temple of the god, he withdrew to the supper and his necessary concerns. But when it was dark, and the fire about the sacrifice was abated, all of them invested with a most beautiful azure garments, and sitting on the ground near the burnt victims, spent the whole night in extinguishing the fire of the sacrifice, and in judging and being judged, if any person had accused some one of them of having transgressed the laws. When the judicial process was finished, and day appeared, they wrote the decisions in a golden table, which, together with their garments, they dedicated as monuments in the temple of the god. There were also many other laws respecting sacred concerns, and such as were peculiar to the several kings: but the greatest were the following: that they should never wage war against each other, and that all of them should give assistance if any person in some one of their cities should endeavour to extirpate the royal race. And as they consulted in common respecting war and other actions, in the same manner as their ancestors, they assigned the empire to the Atlantic family. But they did not permit the king to put to death any of his kindred, unless it seemed fit to more than five out of the ten kings. Such then being the power, and of such magnitude at that time in those places, divinity transferred it from thence to these parts, as it is reported, on the following occasion. For many generations the Atlantics, as long as the nature of the god was sufficient for them, were obedient to the laws, and benignantly affected towards a divine nature, to which they were allied. For they possessed true, and in every respect magnificent conceptions; and employed mildness in conjunction with prudence, both in those casual circumstances which are always taking place, and towards each other. Hence despising every thing except virtue, they considered the concerns of the present life as trifling, and therefore easily endured them; and were of opinion that abundance of riches, and other possessions, was nothing more than a burthen. Nor were they intoxicated by luxury, nor did they fall into error in consequence of being blinded by incontinence; but being sober

sober and vigilant, they acutely perceived that all these things were increased through common friendship, in conjunction with virtue; but that, by eagerly pursuing and honouring them, these external goods themselves were corrupted, and together with them virtue and common friendship were destroyed. From reasoning of this kind, and from the continuance of a divine nature, all the particulars which we have previously discussed were increased among them. But when that portion of divinity, or divine destiny, which they enjoyed, vanished from among them, in consequence of being frequently mingled with much of a mortal nature, and human manners prevailed, then, being no longer able to bear the events of the present life, they acted in a disgraceful manner. Hence to those who were incapable of seeing, they appeared to be base characters, men who separated things most beautiful from such as are most honourable: but by those who were unable to perceive the true life, which conducts to felicity, they were considered as then in the highest degree worthy and blessed, in consequence of being filled with an unjust desire of possessing and transcending in power. But Jupiter, the god of gods, who governs by law, and who is able to perceive every thing of this kind, when he saw that an equitable race was in a miserable condition, and was desirous of punishing them, in order that by acquiring temperance they might possess more elegant manners, excited all the gods to assemble in their most honourable habitation, whence, being seated as in the middle of the universe, he beholds all such things as participate of generation; and having assembled the gods, he thus addressed them: Plato was prevented by death from finishing this most interesting dialogue.

EXPERIMENTS ON PRUSSIAN BLUE,
BY M. PROUST—---ANNALES DE
CHIMIE, NO. 67.

IT has been imagined that iron is capable of uniting with oxygen in every proportion between .27 and .48; but a number of facts seem to show that this is not the case in every instance: for notwithstanding the strong attraction which the oxyds of this metal have for oxygen when exposed to the air, we are only acquainted with two of its sulphates.

The first is the green crystallizable

sulphate, in which, as Lavoisier has shown, the metal contains only .27 of oxygen. This salt, when pure, is insoluble in spirit of wine: its solution in water has a very slight green tinge, it does not give a black with the acid of galls, nor a blue with the alkaline prussiates.

The second species of sulphate, no less invariable in its properties, is that red deliquescent salt known by the name of mother-water of vitriol. It is soluble in alcohol, not susceptible of crystallization, and not altered by oxygenated marine acid. It contains .48 of oxygen. This sulphate possesses exclusively the property of giving a black precipitate with galls, and a blue with alkaline prussiates. There is no intermediate salt between these two. The green sulphate, when exposed to the air, is partially converted into the other, which latter is separable by alcohol. The precipitates from these salts, by caustics alkalies preserve properties peculiar to each. That from the green sulphate is green at first, but soon blackens if kept under water and not in contact with air. The red sulphate gives a yellow precipitate, which is not altered by air nor by oxygenated marine acid. In like manner we have two muriates, two arseniates, and two prussiates of iron, and every solution of this metal in any of the above acids contains two salts, the one, in which the metallic oxyd contains .27 of oxygen, and the other, .48. It is to the prussiates of iron that Mr. Proust has particularly attended.

To obtain the *white prussiate of iron*, a very pure solution of the green sulphate of iron must be employed, and for this purpose the salt must be kept in a well-closed bottle, and lying on a tin or iron plate. The same end, however, is answered by converting the red oxyd that may be found in the solution, into the state of black oxyd, by adding some water saturated with sulphurated hydrogenous gas. The sulphate, thus purified, should not be altered by the gallic acid. To this solution must be added a solution of pure prussiate of pot-ash, when an abundant white precipitate will be formed, which soon takes a slight green tinge. This precipitate has a stronger affinity for oxygen than any of the known salts of iron, and in saturating itself with this principle, it assumes a deep blue. Neither the sulphuric nor muriatic acids produce any change on this precipitate, but the oxygenated muriatic acid instantly turns it blue,

blue, and loses its own peculiar odour. The sulphurated hydrogen has no effect on this precipitate.

The blue prussiate of iron is that in which the metal is fully saturated with oxygen, and therefore contains .48 of this principle, and no intermediate point is observed between this and the white precipitate. It is, therefore, to the white prussiate, what the red is to the green sulphate. The solution of sulphurated hydrogenous gas, if kept in a bottle along with Prussian blue, is decomposed. The hydrogen unites with a part of the oxygen contained in the Prussian oxyd, reducing this latter to the state of white prussiate. This explanation holds good when the red sulphate and the nitrate of iron are exposed to sulphurated hydrogen. The oxyd of iron consumes the hydrogen, the sulphur is deposited, and the solution gives a green precipitate with alkalies. We have by this means a method of bringing to the state of green vitriol the common copperas, as it is sold in the shops. Where a brown precipitate is formed, it is a proof that it contains copper.

The hepatic water is not the only method that may be employed to bring the blue prussiate to the state of white prussiate. The same effect is produced if Prussian blue is kept in a well-closed bottle under water along with iron or tin filings.

It has been mentioned above, that the green sulphate of iron does not blacken with the acid of galls. This, however, is only the case when they are first mixed together, for the liquor presently grows dark by absorbing oxygen from the air, and blackens from the surface downwards. A few drops of oxygenated marine acid produce this effect instantly, and thus it appears that the gallate of iron, or common ink, contains the metal in the highest state of oxygenation: and if ink is kept in contact with hepatic water, the blackness is destroyed. We thus see the reason why common ink, if fresh made, grows darker whilst drying on the paper, because the green vitriol usually employed contains only a small portion of the red oxyd mixed with the green. In a word, it appears that the property of blackening the acid of galls belongs exclusively to the oxyd of iron that contains .48 of oxygen, and therefore is at its highest point of saturation.

To the Editor of the Monthly Magazine.
ON MR. HUME'S ACCOUNT OF THE
ORIGIN OF THE IDEA OF NECESSARY CONNECTION.

SIR,

THE principal means by which Mr. Hume proposes to "banish all that jargon, which has so long taken possession of metaphysical reasonings, and drawn disgrace upon them," is the following: "all our ideas, or more feeble perceptions, are copies of our impressions, or more lively ones." This he lays down as a general rule, and requires those who assert that it is not universal, to produce an instance of some idea which is not derived from any impression. In the mean time, however, he takes a precaution which effectually secures his principle against any possible exception, by resolving, that if any idea shall hereafter present itself, which cannot be derived from some impression, he will consider it as no idea at all. "When we entertain," he tells us, "any suspicion, that a philosophical term is employed without any meaning or idea (as is but too frequent) we need but enquire, *from what immediate impression is that supposed idea derived?* And if it be possible to assign any, this will serve to confirm our suspicion." "Where we cannot find any impression, we may be certain that there is no idea."

Having thus established his principle, he proceeds to its illustration. The idea which he selects for this purpose, and the reality of whose existence he thus puts to the test, is that of a cause. "We must enquire," says he, "how we arrive at the knowledge of cause and effect?" And this, he assures us, perfectly accords with his principle; it "arises from experience," that is to say, it is copied from our *immediate impressions*.

He does indeed acknowledge, that "the particular powers," or *causes*, "by which all natural operations are performed, never appear to the senses;" that is, *never make any immediate impression*; and that "he has not by all his experience acquired any idea or knowledge of the secret power by which one object produces the other." And upon this he remarks, agreeably to his principle, that "as we can have no idea of any thing which never appeared to our outward sense or inward sentiment, the necessary conclusion seems to be, that we have no idea of connection or power at all, and that these words are absolutely without any mean-

meaning, when employed either in philosophical reasonings, or common life.

The question here seems to be, whether we shall relinquish the principle, or discard this stubborn idea that will not submit to it? Some men, I have no doubt, would willingly give up every idea in their heads, rather than incommode their favourite system; but Mr. Hume would not do this rashly. "There still remains," says he, "one method of avoiding this conclusion." Well then, let us see how this unfortunate idea will escape.

It is not, he owns, reasonable to conclude, merely "because one event, in one instance, precedes another, that, therefore, the one is the cause, the other the effect;" because, "we can never observe the tie between them." For instance, when I strike this table, the blow is followed by a sound, and all that I perceive are the motion and the sound; but I do not see what it is that connects these events, nor, if this were the first time I had observed them, should I have any idea of a necessary connection between them.

But "when many uniform instances appear, and the same object is always followed by the same event, we then begin to entertain the notion of cause and connection. That is to say, after observing two events constantly succeeding one the other, we conclude that they must always occur for the future in the same order, and that, whenever the first takes place, the other must of necessity follow it. Mr. Hume says, it is not "by any process of reasoning" that we draw this conclusion. How then? By "custom or habit; for," he argues, "whenever the repetition of any particular act or operation, produces a propensity to renew the same act or operation, without being impelled by any reasoning or process of the understanding; we always say, that this propensity is the effect of custom." "When we say, therefore, that one object is connected with another, we mean only, that they have acquired a connection in our thought."

Accordingly, one of his definitions of a cause is, "an object followed by another, and whose appearance always conveys the thought to that other." Let us try this by an instance:—Suppose a philosopher, who, with an excellent stomach, had all his life been used to live well, so that at a certain hour, when he began to feel himself hungry, he was

regularly served with a good dinner; then imagine that a set of lean half-famished philosophers, of some other sect, merely for the sake of an experiment, should eat up his dinner for him. Well, at the usual time his appetite returns. That event, which had always been succeeded by another so very agreeable, immediately conveys his thought to that other; because, forsooth, the appetite and the dinner have acquired a connection in his thought, and he feels a strong propensity to renew a peculiar act or operation. Here are all the symptoms of causation; but no dinner! How the philosopher would be surprised. In a little time, however, he would see that Hume was mistaken. He would find that the customary connection of two events might cause an association of his ideas, so that, when one of the events occurred it would convey his thought to the other; but this would no more make him expect that other, than he would expect a dinner because his appetite put him in mind of it. He would learn not to consider one event as the effect of another, merely because the ideas were associated in his mind; he would look not only for a customary, but a necessary connection between them: but it is clear that custom or habit can only associate our ideas, and give us the notion of a customary connection. The question is, how do we get the idea of a necessary connection? Says Mr. Hume, "When the same object is always followed by the same event, we then begin to entertain the notion of cause and connection." This is a fact which no one disputes; the only question is, *why* do we then begin to entertain such a notion? Upon the bare experience, that a certain event has hitherto been succeeded by another, why do we with such assurance conclude, that it must always be succeeded by it? Mr. Hume tells us, it is because "We then feel a new sentiment or impression, to wit, a customary connection in the thought or imagination, between one object and its usual attendant; and this sentiment," he informs us, "is the original of that idea which we seek for." If the idea in question, which is that necessary connection, be copied from the idea of customary connection, the idea of black may be copied from that of white. Let the customary connection have lasted as long, and the habit of observing it have grown as obstinate as you please, it can never change its nature; it is still but a customary connection, and how

how it should raise in the mind a totally new idea, seems perfectly inconceivable. The gap is still unclosed, and the space between the *has been* and the *must be*, is as wide as ever. But it may be insisted, that the habit of constantly observing a connection, acts so upon the mind, as to make us afterwards positively expect it, and believe it absolutely necessary. If this assertion were sufficient, nothing could be more easy or more common; but the cause here assigned is notoriously inadequate to the effect. What is there in the circumstance, of my having hitherto always seen two events connected, that seems at all calculated to raise in me a belief, that they could not possibly have occurred separately, and that they must always for the future be so joined? That, upon experiencing a customary connection, or rather a constant order of succession, we do conceive the idea of a necessary connection, is allowed; but what proof have we that this experience is the cause of the idea? If we examine the nature of the experience, we find nothing in it that bears the least reference to such an idea; so that the argument stands thus: habit certainly produces the idea of necessity, because it is succeeded by that idea in the mind. In fact, it is an assertion unsupported by argument. What is the usual effect of habit? Mr. Hume tell us, it is "a propensity to renew a particular act or operation," in other words, it is a desire of obtaining something to which we are accustomed. But can my desire of a thing persuade me that I must necessarily obtain it, and that the whole order of nature would be destroyed if I should not? Doubtless it will be insisted, that the strong desire or propensity, derived from habit, to renew the connection between two events, does absolutely raise in us a belief, that there is a necessary connection between them, and that this desire of renewing it, compels us to think that it will be renewed. Yet this assertion is still more destitute of proof than the last. How has it been proved that we have any desire that the effect should follow the cause? Ask the thief at the gallows whether he desires that the rope should strangle him. It may be said, perhaps, that desire is the constant effect of habit, and may therefore be supposed; but never, surely, did the greatest dunce contract a liking to the birch, though in the habit of being flogged daily. The repetition even of what was once agreeable, fre-

MONTHLY MAG. XXVI.

quently becomes tiresome, and what is so eagerly pursued as variety? But that the mind takes no pleasure in the constant union of the effect with its cause (merely as such) seems evident from the greediness with which men swallow the monstrous stories of enchantment, ghosts, miracles, &c. where all that so much delights us is, the disorderly production of some effect by an unusual cause. Yet I will even suppose it proved, that we have some occult desire or propensity to renew the connection between events, still the chief point is to be considered. It has not yet been shown, that the mere desire of a thing is in any way calculated to produce a belief of its necessity, nor does it appear that such a desire could even form the idea of necessity in the mind; at least, I can see no reason to conclude that it does, and Mr. Hume does not supply me with any; on the contrary, he confounds the two things together, and then accounts for them as if they were one and the same. In order to prove that the habit of observing a connection gives us the idea of its necessity, he tells us, that it creates a propensity to renew it; as if the propensity to, or desire of, a thing were not to be distinguished from the conception of its necessity. These are certainly two very different ideas, nor do I see that one in the least refers to the other. Whether we are told, therefore, that habit produces the idea of necessity, or, that habit only raises a propensity, and that this propensity causes the idea; what is all this but assertion and conjecture, unsupported by reason?

Indeed, Mr. Hume himself, as if internally conscious that he had not traced the idea to its source, drops the term *habit* and has recourse to that of *instinct*.

Speaking of "this operation of the mind, by which we infer like effects from like causes;" he tells us, "it is more conformable to the ordinary wisdom of nature to secure so necessary an act of the mind by some instinct or mechanical tendency, which may be infallible in its operations, may discover itself at the first appearance of life and thought, and may be independent of all the laboured deductions of the understanding."

I understand by *instinct*, a power depending upon the peculiar structure of the mind, and which determines it to some particular act. If it be by instinct, therefore, that we infer one event from another, that is, if the peculiar structure of the mind make us conceive a necessary connection

connection between two events or impressions; that instinct is the origin of the idea of necessary connection, and not the mere impressions or events which were only connected by it in our thought. "Nature," he continues, "has implanted in us an instinct which carries forward the thought in a correspondent course to that which she has established among external objects." But this is not enough. An instinct which shall make me conclude one event to be the cause of another, must not only carry my thought from one to the other; it must not only associate the two ideas, and remind me of their customary connection; it must actually produce in my mind the idea of a necessary connection between them; for till it does this, it cannot make me conclude that one is the cause of the other. If the instinct do not give me the idea of a necessary connection between events, it cannot make me infer like effects from like causes; and, therefore, such an instinct would not answer the purpose; and if we get the idea from any other quarter, for instance, from observing the "course established among external objects," the instinct is altogether superfluous, for in that case, all we want is memory.

But it has been proved, that we did not acquire this idea by observing the course of events, as in all that course there is nothing like the idea to be observed. Therefore, whether we have an instinct, and the idea originate in it, or whatever may be the origin of this idea, it does not appear that it could either arise from the connection of events in any single instance; or from the customary connection in a number of instances; or from the habitual association of ideas, arising from that customary connection; or even from any desire we may be supposed to have for the renewal of the connection. We cannot, therefore, attribute it to the impressions of sense, either immediately or mediately; so that it stands in direct opposition to the principle of Mr. Hume.

It remains now to be decided, whether we shall discard an idea which seems essential to human reason, or give up the universality of this principle? Those who resolve to abide by the principle, let what will become of the idea, should at least be as candid as Mr. Hume has been, and first, carefully examine whether there be not some impression from which it might be derived; after that, they may, if they please, deny its existence, as a dog-

matical shoemaker might swear you have no feet, because his shoes will not fit them.

But it may be said, according to Mr. Hume's system, an idea is in fact no idea, unless it be derived from some impression; nor till he has discovered that impression, does he speak of it positively as such, he calls it only a *supposed idea*. What an excess of refinement is this! We hear every day of the supposed advantages of a ruinous war, that is to say, advantages that exist only in idea; but here is an *idea* which exists *only in idea*. I wonder how some philosophers would have an idea exist. If we ask Berkeley in what way ideas exist, he tells us plainly (see. 139) that *they exist merely by way of idea*, and I confess I am of his opinion.

I shall not, however, attempt to prove the existence of this idea; as to those who have not the idea, it would be impossible, and to those who have, superfluous. Yet it may not be amiss to apprize those who deny its existence, of the dilemma to which they are reduced. Either they must acknowledge they have the idea, whose existence they deny; or confess they have no idea of what they deny.

It may be asked, of what use is this inquiry into the origin of ideas? Shall we not continue to act upon the belief of a necessary connection between events, and will not the effect as regularly follow its cause, whether we know the origin of this idea or not? Certainly. And what is more, we shall probably continue to dispute about the existence of a FIRST CAUSE, and argue as learnedly as ever, both for and against the doctrine of NECESSITY, whether we are able to tell *how such an idea ever came into our heads* or not. This is undoubtedly true, and yet there is one reason why I wish we were able to account, not only for this, but for a thousand other phenomena in the mind; and that is, that we might have some plea for rejecting, without examination, the system of Professor Kant; for it would be an excellent excuse for treating the philosophy of other nations with contempt, if we could but produce a reasonable and consistent theory of our own.

H. RICHTER.

To the Editor of the Monthly Magazine.

SIR,

THE commercial class of your readers may probably collect some information, were you to insert the following observations

servations and calculations upon the Exchange.

The course of exchange between countries wanting to remit, is primarily regulated by the relative value of the current specie in each respective country. Those which have a great diversity of circulating specie, generally regulate their currency by reckoning an *agio*, which varies in different countries from 5 to 40 per cent.

Bills drawn in Great Britain, upon Hamburgh, Holland, or the Netherlands, are considered payable in *banco*, that is to say, in money, either real or fictitious, of a certain standard value; and the party on whom such bills are drawn sometimes receives, but mostly pays, an *agio* or discount, proportioned to the intrinsic value of the currency.

All bills drawn on Great Britain are supposed payable in the standard coin of the kingdom, there is consequently no necessity for an *agio*, yet the exchange is more or less favourable, according to the purity or deficiency of the current specie.

Since the guineas in circulation have been standard weight, the exchange has continued in favour of this country; but should the specie be again generally deficient, it would soon affect the price of exchange with all Europe.

Some years ago when the clipped money was in circulation, the exchange with Amsterdam fell to 26s. Flemish per pound sterling, which is only 780 guilders for 100l. sterling, instead of 1100 guilders, which is reckoned about par. But when the new coinage got into circulation, the exchange rose to 38s. Flemish, or 1114 guilders, for 100l. sterling. It requires to be remarked, that Holland and the Netherlands reckon 6 guilders to 20s. Flemish; Hamburgh $7\frac{1}{2}$ March *banco* to the same, or a pound Flemish. It follows that in all those countries with which this country exchanges sterling for pounds Flemish, the more shillings Flemish a pound sterling is negotiated for, the more guilders or marks, &c. is received for 100l. sterling.

Multiply by

$$\begin{array}{r}
 269 \\
 115 \\
 \hline
 1345 \\
 2959 \\
 \hline
 3093 \ 10 \\
 20 \ 3 \ 8 \\
 \hline
 G. \ 3113 \ 13 \ 8 \\
 \hline
 \end{array}$$

3 dist. from 115, or $38\frac{1}{4}$, is

The following concise method of working the said exchanges, it is presumed, claim some just pretensions to being original:

Multiply the exchange by 3 (*viz.* half the number of guilders to a pound Flemish) which at 38, makes 114 guilders for 10l. by only striking off the 4, and multiplying it by 2, makes 11 guilders 8 stivers for 1l. and by adding a cypher, it makes 1140 guilders for 100l. Any other exchange multiplied by 3, the result will be similar. Shillings and pence may be readily taken from a single pound.

The uniform advance for every grot being two guilders 10 stivers:

	s.	d.	s.	d.
for 100l. sterl. see	38	and	38	1
it must be for	38	2	5g.	
for	38	3	7g. 10st.	
and every fourth grot			10g.	

Which requires one to be added to the multiplier, *viz.*

$38\frac{1}{4}$ is 115

$38\frac{1}{4}$ — 116 and so for any higher or lower rate.

By making the above rules familiar, the guilders in 1l. 10l. or 100l. may be reckoned from memory, as also the marks for 1l. 8l. and 80l. dividing the 3 first figures by 8, instead of 10 for the 1l. because the Hamburgh exchange, multiplied by three, answers to only 8l. sterling.

To apply this operation to 269l. sterling at 387, multiply by 115, striking off the first right-hand figure from the first produce, and always doubling it, place it to the stivers, which has the same effect as multiplying by 11 guilders 10 stivers, the sum for 1l. sterling for the intermediate grots between the different multipliers as before directed, add for the first grot half the pounds you multiply—for the 2nd, the whole—and for the 3d, one and a half, always dividing them by 20, because every additional grot makes half a stiver for 1l. sterling. Example, showing how many guilders there are in 269l. sterling exchange at 38s. 7d.

because 3 times $38\frac{1}{4}$ is 115

being $1\frac{1}{2}$ of 269l. by 20

the number of guilders to be paid for 269l. sterling at 387

4 A 2

Aa

As proof of the above, reduce the answer into half-stivers, and divide by the exchange reduced to grots; viz.

$$\begin{array}{r}
 \text{38s. 7d. by 12, is 463 for the divisor G.} \quad \begin{array}{r} \text{stiv. dens.} \\ 3113 \quad 13 \quad 8 \\ 20 \quad \text{OR} \quad 20 \end{array} \\
 \hline
 62273 \\
 40 \\
 \hline
 463)2490940(5380 \text{ shillings by 20, is } \text{£.269 st.} \\
 2315 \\
 \hline
 1759 \\
 1389 \\
 \hline
 3704 \\
 3704 \\
 \hline
 0
 \end{array}$$

Although there are only 16 deniers to a stiver, it will lessen the fractions to work by 20 or 40, in which case 10 or 20 stands for 8 deniers only.

PRINCIPAL AXIOMS.

Multiplying the shillings Flemish by 3, shows the number of guilders in 1l. 10l. and 100l. for every grot add half a stiver for 1l.; 5 stivers for 10l.; and 50 stivers for 100l.; but when it amounts to 4 grots, add one to the multiplier, to 8 add 2, and for half a grot, half the afore-said stivers.

The same operation shews the number of marks and schillings in 1l. 8l. and 80l.; dividing for 1l. by 8 instead of 10, as for the guilders.

Multiplying the shillings Flemish by 6, as before directed by 3, will produce 2l. 20l. or 200l.; by 9, will produce 3l. &c.

The number of marks, in any given number of pounds sterling, is a fourth more than the number of guilders.

To find how much sterling money there is in any given number of guilders or marks, reduce the guilders to half-stivers by 40, and the marks by 32, there being the same number of half-stivers in 6 guilders by 40, as in $7\frac{1}{2}$ marks by 32; in both cases divide by the exchange reduced to grots, viz. 38 7 by 12, is 463; if the exchange is done at half-grots, then the multipliers and divisors must be doubled.

TABLE SHOWING THE NUMBER OF GUILDERS IN 100 POUNDS STERLING.

Exchange.	Multiplier	For 100l.	Exchange.	Multiplier	For 100l. st.	Exchange.	Multiplier	For 100l. st.
34	102	1020	38	114	1140	39	11	1170
1		1022 10	1		1142 10	1		1172 10
2		1025	2		1145	2		1175
3		1027 10	3		1147 10	3		1177 10
4	103	1030	4	115	1150	4	118	1180
5		1032 10	5		1152 10	5		1182 10
6		1035	6		1155	6		1185
7		1037 10	7		1157 10	7		1187 10
8	104	1040	8	116	1160	8	119	1190
9		1042 10	9		1162 10	9		1192 10
10		1045	10		1165	10		1195
		1047 10	11		1167 10	11		1197 10

Thirty guilders is the difference for every shilling Flemish for 100l. sterling, and for every half-groat one guilder five stivers.

The exchange, at 35s. a groat, more or less, is 4s. 9d. in 100l. sterling; at 36s.—4s. 7d $\frac{1}{2}$; at 37s.—4s. 6d.; at 38s.—4s. 4d $\frac{1}{2}$; at 39s.—4s. 3d; and, at 40s. exactly 4s. 2d.

The course of exchange being affected both by the necessity for making commercial remittances and the negotiation of bills, it can neither be expressly governed by the par of the money of the countries traded with, nor determine the balance of trade between them. It only, at the time of payment, decides the cost of each country's imports, and the price of its exports; but, from numerous artificial causes, can never determine the degree of either. That country which generally possesses the exchange in its favour, may be induced to import foreign productions, because of their cheapness, while its own exports and manufactures are declining, because rendered too dear for foreign consumption, which often occasions a very injurious delay of remittances.

In Holland, Hamburgh, and all those countries where the exchange is governed by giving pounds Flemish for sterling money, the higher the exchange, the more it is in favour of Great Britain. But in Russia, France, Spain, Italy, and the South of Europe, where their currency is negotiated at a certain number of pence sterling; the lowest exchange is the most in favour of this country.

Norwich, March 14th, 1797. K. Y.

For the Monthly Magazine.

MEMOIR ON THE PROPORTIONAL QUANTITY OF LIGHT GIVEN BY DIFFERENT COMBUSTIBLE BODIES, AND ON THE VARIOUS KINDS OF LAMPS THAT ARE COMMONLY MADE USE OF.

BY J. H. HASSENFRATZ.

Annales de Chimie, No. 70.

THE French government employed Mr. H. in the year 1795, to make a series of experiments, to determine the most economical method of procuring light from the different combustible substances usually employed. Mr. H's experiments differ in some degree from those of Count Rumford, the cause of which he endeavours to explain. The materials of Mr. H's experiments were wax, spermaceti, and tallow candles, fish-oil, oil of cole-seed, and of poppy-seeds. In using these oils, both the Argand and common lamps were em-

ployed. The wicks of the latter were round, containing thirty-six cotton threads. The tallow and spermaceti candles were mould, six to the pound. The wax candles five to the pound. Mr. H. used the same method with Count Rumford, for determining the comparative intensity of the lights. It consists in placing the two luminous bodies at different distances on white paper, putting a small opaque cylinder near this paper, and gradually removing the light, till the shadow produced by each be of the same intensity. The intensity of the light is then in proportion to the squares of the distances of the luminous bodies, from the line of union of their two shadows on the white paper. Count Rumford used the Argand lamp as a standard for comparison; but as the intensity of its light varies according to the height of the wick, Mr. H. preferred a wax candle, making use of it soon after it was lighted. When two luminous bodies, of different intensities, are put in comparison with each other, the shadows are of two colours. That from the weakest light is blue, and from the strongest, red. When the lights of two different combustible bodies are compared, they are either red or blue in a compound ratio of the colour and intensity. Thus in comparing the shadows from different luminous bodies, they will be red or blue respectively, in the following order:

- Light of the sun.
- ... of the moon.
- ... of Argand lamps.
- ... of tallow candles.
- ... of wax ditto.
- ... of spermaceti ditto.
- ... of common lamps.

That is to say, when a body is illuminated by the sun and by any other luminous substance, the shadow of the former is red, and of the latter, blue. In like manner, the shadow from an Argand lamp is red, when placed by that of a tallow candle, which is blue.

The following table will show the proportional distance that different luminous bodies should be placed to produce an equally intense shadow from the same object.

The second column gives the proportional intensity of each light, which is known to be in proportion to the squares of the distances of luminous bodies giving the same depth of shadow.

The third column shows the quantity of combustible matter consumed in the hour by each mode of giving light, which Mr. H. calculates from the average of many repeated experiments.

Distance

	Distance.	Intensity	Quantity consumed per hour.	Quantity required for equal intensities.
Argand lamps with {	Oil of poppy seed	10	10.000	23
	— of fishes	10	10.000	23.77
	— of cole-seed	9.246	8.549	14.18
Common lamps with {	Oil of cole-seed	6.774	4.588	8.81
	— of fishes	6.524	4.556	9.14
	— of poppy-seed	5.917	3.501	7.05
Spermaceti candle	5.917	3.501	9.23	26.37
Old tallow candle	5.473	2.995	7.54	25.17
New ditto	5.473	2.995	8.23	27.48
Wax candle	4.275	1.827	9.54	53

The relative quantity of combustible matter required to produce equal lights at equal distances, may be obtained by a simple rule of proportion from the above data. Thus, if a given intensity of light, expressed by 3.501, has been produced by a consumption of 9.23 of spermaceti in the hour, the same luminous body will produce a light of 10.000, by consuming in the same time a quantity of spermaceti $= \frac{10.000 \times 9.23}{3.501} = 26.37$.—Therefore we may add to the table a fourth column, expressing the quantity of combustible matter which each body must consume to produce a light of 10.000.

From what has been laid down, it will also appear that the number of lights required to produce a given light, will be as follows: To produce a light equal to 100 Argand lamps, burning poppy-seed oil, it will require

100 Argand lamps with fish oil	285 Spermaceti candles
117 Ditto do. with cole-seed oil	333 Tallow ditto
218 Common lamps with cole-seed oil	546 Wax ditto.
219 Ditto do. with fish oil	
285 Ditto do. with poppy-seed oil	

Mr. H. next takes notice of the comparative price of these articles, by which he finds, that in Paris the most expensive light is that produced from wax candles; and the most economical, that from oil of cole-seed, burned in Argand lamps.

The chief difference between the Argand and common lamp is, that in the latter much of the oil is volatilized without combustion, and hence the unpleasant smell which it produces; whereas in the former, the heat is so great at the top of the wick, that all the oil is decomposed in passing through, the disposition of the wick allowing the free access of air to assist combustion. It should therefore follow, that the Argand lamp consumes less fuel to produce a given light than the common lamp, and this is the opinion of Count Rumford. Yet (Mr. H. observes) there are two circumstances that prevent the full effect of the complete combustion

in the Argand lamp. The one is, that the glass cylinder absorbs a part of the rays of light as they pass through; the other, that the column of light proceeding from the inner surface of the wick, is, in part, lost, by being obliged to pass through that from the outer surface. Count Rumford allows the first cause of diminution of light, and estimates it at .1854, but not the latter. The author of this memoir, in repeating Count R's experiments, asserts, that when two candles are placed so that the light of the one is obliged to pass through that of the other, the sum of the light so produced, is not so strong as when they are placed side by side; for in the first case, a part of the hindmost light is absorbed by the foremost. Mr. H. concludes the paper by some general observations on the comparative elegance and utility of the various methods of illumination.

For the Monthly Magazine.

HISTORY OF ASTRONOMY FOR THE YEAR 1796, BEING THE FOURTH YEAR OF THE FRENCH REPUBLIC. TRANSLATED FROM THE FRENCH OF JEROME LALANDE.

THE establishment of the National Institute, on the 6th December, 1793; the regulations which have been prescribed for the conduct of it, on the 5th of June, 1796; and the premiums proposed by the Institute, for the invention of the best watch—consisting each of a gold medal of the weight of a *kelogramme*, or 3200 livres—promise to prove of essential service to the progress and improvement of astronomy.

Towards the end of February, I had the satisfaction to receive from citizen Lenoir, an entire circle of nineteen inches, an instrument which I had upwards of two years been in expectation of, by means of which citizen le François has already determined the latitude of Paris, 48 degrees 56 minutes 15 seconds—the obliquity of the ecliptic, 23 degrees 28 minutes 1 second, at the end of June, 1796; being greater by eight seconds, than stated in the tables of the sun, which accompany the third edition of my astronomy.

Citizen Mechain, at Perpignan, has made exactly the same calculation; but as other observations give 12 seconds less, we will reserve the discussion of this question to a future opportunity.

The Board of Longitude has sent to citizen Duc la Chapelle, jun. at Montauban, the sextant, of six feet, with which Lacaille made his last observations; this ingenious astronomer has taken several observations this year, which he proposes to print.

March 31st, M. Olbers discovered, at Bremen, a comet in the Virgin; he has accurately observed it, and calculated the elements. This comet is the 85th which has been recorded, according to the catalogue given in my astronomy. Its errors, from the 31st of March to the 14th of April, only once amounted so high as six minutes.

Node, 0 signs 17 degrees 2 minutes.

Inclination, $64^{\circ} 55'$.

Perihelion, 6 signs $12^{\circ} 44'$.

Distance of perihelion, 1,578.

Passage, on 2d April, 1796, 20 hours 23 minutes. Comet retrograde.

The opposition of Mars happened on the 14th of June, on which reason the error discovered in my tables of 54 seconds, induced me to examine the equation of

this planet, comparing this opposition with the one in 1788, which was in the contrary part of its orbit. On this occasion, I accurately observed the perturbations, which I had neglected to do, till now, although I had given a calculation of them in 1758 and 1761. I have found that it is necessary to add about 15 seconds to the equation of Mars, stated in my last tables; but I do not propose to make any alteration, till citizen Delambre shall have made a fresh calculation of the perturbations, which he means to do, as soon as he shall accomplish his grand undertaking, respecting the meridian, which has interrupted his researches, as well as those of citizen Mechain, for two years.

The equation of Mars, according to the result of my newest observations, will be less by 48 seconds than that mentioned by M. Triesnecker, in that part of his memoir where he makes use of the perturbations (*Ephem. de Vienne*, 1789).

The opposition of Mars was observed by M. Zach, at Gotha, the 14th of June, 1796, and lasted 14 hours 49 minutes 30 seconds, in 8 signs 24 degrees 34 minutes 37 seconds of the apparent equinox. Latitude 3 degrees 37 minutes $54\frac{2}{3}$ seconds south latitude. Heliocentric, 1 degree 6 minutes 9 seconds. Error in my tables less than 55 seconds longitude: but upwards of 18 seconds latitude.

The conjunction of Venus, observed on the 6th of August, by citizen le François, gives an error in my tables from five to six seconds: and as Venus was aphelion, this circumstance affords a satisfactory confirmation of the determination which I have given of this difficult element (*Mémoires de l'Académie*, 1785).

M. de Zach, of Gotha, found an error in my tables, on the 29th of June, of rather more than four seconds in longitude, and less than 15 seconds in latitude.

The opposition of Jupiter, observed the 29th of August by Bouvard, gives an error in the tables of Delambre, of seven seconds. This is a convincing proof of the grand inequality announced by Laplace the 10th of May, 1786.

In the opposition of Saturn, the 15th December, 1796, the error of the tables proves to be less than 31 seconds. This affords a confirmation of this discovery, and of the skill with which Delambre has constructed his tables of Jupiter and Saturn.

The eclipse of the 4th star in Sagittarius is a rare and singular observation, made at Viviers by Fl. Caugergue, and in England, by M. Englefield. The former of

of these gentlemen discovered it on the point of emerging. It still bordered on the disk of Mars, the 17th of April, at five o'clock, 58 minutes 25 seconds. He found that the conjunction had taken place three minutes 12 seconds earlier, and that Mars was more north than the star, by 10 seconds. The longitude of Mars was then eight signs, seven degrees, six minutes 26 seconds: latitude 20 minutes five seconds. Latitude heliocentric 10 minutes, seven seconds. He calculates the right-ascension of the star, at 266 degrees 50 minutes 22 $\frac{1}{2}$ seconds. Declension, 23 degrees 46 minutes 48 seconds.

The 26th December, a conjunction happened, which if less remarkable for astronomers, was more so for the public. Mars was discovered above, and very near, Jupiter. Duc la Chapelle observed this conjunction carefully at Montauban.

Government, ever eager to promote the cause of science, have given directions by the minister Benzeck, to publish the *Histoire Céleste*, which comprizes all the observations made at Paris, and the 40 000 stars, which have been determined in the Military School. One hundred and twenty pages were already printed off on the 1st of January, 1797.

This History will contain successively all the observations made at Paris, for these fifty years past, by Delisle, Lemonnier, Messier, and even the ancient observations; but above all, the discoveries of the Paris Observatory, since 1791, with which year the extracts published by Cassini from 1785 terminate.

The grand work of ascertaining the meridian, is continued with as little interruption as possible. Since the commencement of the year 1796, Dalambre has been employed at Dunkirk in observing the latitude with an entire circle, to determine one of the extremities of the new meridian. The other extremity was determined by Mechain, at Barcelona, in 1792.

July 9th, Dalambre, after having been long retarded by the remissness of the Board, departed for Bourges. He has commenced his labours, by placing signs as far as Hermont, opposite Clermont.

November 9th, he arrived at Sermier, having completed eight stations, and 288,000 toises of the meridian. He proposes to pursue his useful labours, during the winter, at Evaux.

Mechain has been less fortunate, not having been able to commence his operations so early as Delambre. He has been prevented by bad weather at Mount

Noire, to the north of Carcassone, in which town he has determined to pass the winter, and observe the azimuths, to ascertain, more successfully, the direction of his triangles.

Nouet, assisted by the skilful geographical engineer, Cardinet, has been engaged in a very laborious, but highly useful, astronomical campaign, in the Alps. He has constructed very large triangles, which comprehend the entire space inclosed between Thonon, to the north; Saint-Jean de Maurienne, south; Mont Blanc, to the east; and Mont Colombier, west.

Borda is engaged in determining the refractions, both by theory and ingenious and delicate experiments, on the density of the air.

The *Connaissance des Temps*, for 1797, was published in January, 1796. The addenda contains a catalogue of 1000 circumpolar stars; a matter of great importance, and hitherto a desideratum in astronomy: this is the first result of the grand work undertaken, in 1789, by Michel Lefrançois Lalande, and myself, to determine the 85,000 stars, of which 32,000 have been already observed; and Lefrançois, with indefatigable zeal, has, in the course of this year, increased the number up to 37,000.

It contains, likewise, several observations of eclipses, with their results.

Observations of the planets, and, in particular, of Mercury.

An Astronomical Journal, from 1782, with which year the Astronomical History of Bailly concludes, to 1788. The history of the preceding years I have separately published.

Observations made by M. de Zach, at Gotha; M. Barry, at Mannheim; Duc la Chapelle, at Montauban; Vidal, at Toulouse; &c.

I have likewise given a determination of the diameter of the fourth satellite of Jupiter, and new elements of the orbit of Mercury.

The *Connaissance des Temps*, for 1798, appeared in August, 1797. The additions contained in this volume are of greater importance than those of any preceding year. It contains several memoirs, by myself, relative to the motion of the stars, on the satellites of Saturn, on the curve of the apparent orbit of the moon, and the precession of the equinoxes. New tables of Mercury, which I have calculated from the last observations, taking account, at the same time, of the perturbations which Venus occasions on this planet.

The positions of 150 stars, determined by

by Lefrançois, together with a variety of observations by Messier, Duc la Chapelle, Bouvard, Vidal, Piéctet, Flaugergue, Thulis, &c.

Several eclipses, calculated by myself, a description of the entire circle, by Bissy, with the print which General Calon has caused to be engraved, and a representation of the moon.

Memoirs, composed by myself, on the Obliquity of the Ecliptic, on the Longitude of Greenwich, and of the Cape of Circumcision; on the Altitude of Paris, above the Level of the Sea; on the different Altitudes of the Seine, at Paris.

My History of Astronomy for the years 1789, 1791; my tables for ascertaining the Passage of the Stars at Noon, and the Tables of Borda, for reducing the Altitudes of the Polar Stars.

The Elements of the Comet of 1795, by Messrs. Yach, Bouvard, and Prosperin.

The Memoirs of the Academy, for 1789, which have been long in print, but first published this year, contain a long and excellent treatise, by Laplace, on the Satellites of Jupiter; Memoirs, composed by myself, on the Motion of Venus, on the Ebbs and Floods of the Equinoxes, and on a variety of observations which I have calculated. The reader will find, likewise, the commencement of the Observations of the 8000 Boreal Stars, which I made at the Military School; together with the observations of Agelet, prior to his departure for circumnavigating the globe, which has deprived us of the assistance of this young and judicious astronomer.

Memoirs, by Messier, on the Two Comets of 1788; a Memoir, by Legendre, on the Figure of the Planets; Memoirs, by Laplace, on the Changes of the Precession, on the Obliquity of the Equinox, on the Degrees of the Earth, and on the length of Pendulums, from which this curious and interesting discovery results, that the inclination of the true ecliptic on the assumed ecliptic of 1700, the limits of which will be five degrees twenty-five minutes, according to Lagrange (Mem. de l'Acad. 1774, Mem. de Berlin, 1782), reduces itself to one degree twenty-one minutes, because the action of the sun and moon on the terrestrial spheroid, reduces, by one quarter, the extent of the variations of the obliquity which would take place if the earth were a true sphere.

The memoirs for 1790, which are
MONTHLY MAG. XXVI.

already printed, and will shortly be published, contain the sequel of the joint observations of myself and my associate, of the stars, together with the observations made by Agelet, previous to his departure; a long Treatise, by Laplace, on the Flux and Reflux of the Sea; three Memoirs, by Messier, on the Comets of 1790; Memoirs, by Messier and myself, on the Disappearance of Saturn's Ring; the Passage of Mercury over the Sun, in 1789, by Messier, together with the Method of finding the true Anomaly, by Dufejour.

In the *Connoissance des Temps*, for 1797, I am now printing 2000 stars, of the sixth magnitude, which have never been observed nor calculated by any person before.

De Laplace has published his Exposition of the System of the Earth, which contains many new discoveries, and new ideas, on several objects of Natural History and Astronomy.

A third edition of Flamsteed's Atlas, in quarto, has recently been published by La Marche. I have added a considerable number of stars to the catalogue, and corrected various errors. Mechain has likewise greatly contributed towards the perfection of this edition.

The Poem on the Sphere, by Ricard, is an object of consequence to the science of astronomy, as it may assist its propagation. In this poem, the accuracy of the mathematician is happily blended with the luxuriant charms of verse. It was submitted to my inspection in manuscript, but I found little room for remark or alteration.

Mr. Dalby has published, in London, a memoir, consisting of twenty pages, which contains a narrative of the measure of a degree of longitude, and a degree of latitude, executed in the Indies, to the north of Calcutta, in 1791 and 1792, by M. Reuben Burrow. The degree of longitude under the tropic, is 41,620 toises, and the degree of latitude between 22 deg. 44 min. and 23 deg. 48 min.: that is to say, towards the tropic of cancer, 56,726 toises, which is less, by 27 toises, than that of Peru.

The death of Mr. Burrow in May, 1792, has deprived us of the result of his labours, which it was his intention to have prosecuted as soon as he should receive the grand sector, which he has been soliciting ever since 1789.

A watch, by Arnold, with which he
4 B went

went and returned from east to west, has procured a longitudinal difference of two minutes thirty-three seconds.

Mr. Dalby calculates, that these degrees give a plane of $\frac{1}{238}$; but, as this does not correspond with the measure of degrees taken in other places, he concludes that the earth is not a regular ellipsis, which is, indeed, the result of Laplace's researches.

Mr. Herschell has published, in the Philosophical Transactions for 1795, a description and representation of his famous forty-foot telescope.

M. de Rossel, the only surviving officer of the late Capt. Entrecasteaux's equipment, is occupied in London, upon a Narrative of this Voyage, which the British Admiralty design to publish at their expence.

The Vienna Ephemeris, for 1797, besides a variety of observations made at Vienna, Buda, Prague, and Cremsmunster, contains calculations of the longitude for a great number of towns; and a new determination of the distances of the satellites of Jupiter, by Trufnecker. He calculates the semi-diameter of Jupiter's equator, at 1,892 seconds; hence the following comparative distances result:

1st satellite	5.86
2d do.	9.33
3d do.	14.99
4th do.	26.31

Major Zach, the celebrated astronomer of Gotha, has published his Tables of Aberration, with a new catalogue of the right ascensions of 400 principal stars, which are calculated with as great precision as the thirty-four stars of Maskelyne. The instrument he made use of is a meridian telescope, by Ramsden, which is placed with such perfect exactness, that he has scarcely found a perceptible difference between eight stars, distributed in a space of 162 degrees of the meridian, from Antares to Capella, under the pole.

Louis Breguet, a watchmaker of the first eminence in Paris, continues to labour on the perfection of chronometers and time-keepers for ascertaining the longitude. He has invented a scapement, upon a principle entirely new, which is absolutely independent of the movement. This ingenious artist was born at Neufchâtel, Jan. 7, 1749, but has been a resident in France ever since the year 1763. In 1780, he first began to occupy himself with bringing the art to its perfection.

Citizen O'Reilly, who has established a

large glass manufactory at Gros-Callou, manufactures flint-glass for acromatic telescopes. Citizen Carouch has made an experiment, and pronounces them of a very excellent quality.

Don Denis Alcala Galeano, captain of a Spanish vessel, has presented to the Board of Longitude two memoirs on the Calculation of the Longitude and Latitude. We are indebted for these researches to the voyage of Don Alexandre Malaspina to the South Seas, in 1789, which voyage has procured us several interesting observations on the flowing and ebbing of the tides on both coasts of America.

Letters from Spain, dated Nov. 6th, inform us, that the Prince of Peace has established professors of Astronomy, theoretical, practical and physical, and likewise for the application of geography to the purposes of navigation. He has founded likewise a new military corps, under the title of *Cosmographical Engineers of State*; the members of which were presented to the king and queen on the 30th of October.

The Prince of Peace has requested Mr. Herschell to furnish him with a telescope of twenty-five feet, and M. de Mendoza, a Spanish officer, has been commissioned to urge its execution.

Joseph Chaix, a native of Saint Philippe, about eight leagues distant from Valenit, after having successively studied, for several years, the sciences of astronomy and geography, both in France and England, has been appointed to superintend the grand observatory, building at Madrid.

In Germany, M. Schroter has printed a work, under the title *Aphroditographical Fragments*, containing the result of his observations on the figures, the spots, mountains, and rotation of Venus, on which subject he has already published several communications in the London Philosophical Transactions, the Memoirs of Goettingen, Erfurt, and Berlin, and in the Berlin Ephemeris. He has discovered that the mountains in Venus bear nearly the same proportion to the diameter of this planet, as the mountains in the moon to its diameter; and that, as in the moon, the most and highest mountains in Venus are towards the south.

The rotation of Venus appeared to him to be twenty-three hours twenty-one minutes. The alterations, which he observed in the space of two hours, in the horn of this planet, appeared to him to indicate, that the equator of Venus forms a large angle with this ecliptic, and that of con-

consequence, the change of seasons there must be very considerable. He is of opinion that Mr. Herschell has given Venus too large a diameter, when he calculates it at eighteen seconds eight. He computes it at only sixteen seconds $\frac{8}{10}$, as stated by myself and by M. de Zach, in his Berlin Ephemeris.

M. Schaubach has published the *Catasterisms* of Eratosthenes, in Greek and Latin. M. Amma has published a series of Operations, relative to the Topography of Swabia. M. Wurms is engaged in comparing the Tables of Logarithms, by Didot, by which means we shall in future be furnished with a table totally exempt from error, as M. Wurms's corrections are made upon the plates themselves, which have been preserved.

M. Woltman, of Cuxhaven, has made several curious observations and experiments on Terrestrial Refractions. He has transmitted a memoir on this subject to the Goettingen Academy.

M. Hornemann, an Hanoverian, has been fixed upon for exploring the interior of Africa. This gentleman is eminently versed in the Oriental languages, is a proficient in the art of physic, and understands likewise several branches of mechanics. He is an indefatigable pedestrian, robust, daring, and passionately in love with travelling. Major de Zach has offered to enable him to make astronomical and geographical observations, which promises to render the result of his expedition highly interesting and important.

M. Hennert has obtained the prize of the academy of Petersburg, for his Memoir on the Perturbations of the diurnal Motion of the Earth. The result of his observations, which will appear in print, proves, that there are some inequalities in the earth's rotation; but that these are modified in such a manner, that it may be considered as uniform.

The *Ephemeris* of Milan, for 1796, gives us a theory of the perturbations of Mercury, by Mr. Oriani, together with some excellent observations relative to this planet, by M. de Cocaris.

On the conquest of the Milanese by the French troops, several French academicians were deputed to collect all objects useful to the sciences and arts. But the observatories of Oriani de Cefaris, and Reggio, have been respected, and these ingenious astronomers were emphatically recommended to the notice and protection of the French general, Buonaparte.

At Verona, M. Cagnoli is engaged in an Italian Translation of Bailli's *Astronom.* M. Toaldo, of Padua, has translated my *Abridgment of Astronomy*.

Count Ignace Bathiani, Bishop of Weissenburgh, or Alba Carolina, in Transylvania, has erected an observatory in that place, under the inspection of Martonfy, who has commenced his observations.

It now remains for me to notice the losses which astronomy has sustained this year, by the death or sequestration of those who have successfully cultivated this useful science. I have obtained many interesting and valuable particulars, relative to that celebrated mathematician Rigibert Benne, but as his death happened the preceding year, I shall reserve these details for another opportunity.

Alexandre Guy Pingré, marine geographer, late associate of the Academy of Sciences at Paris, and librarian of Sainte Genevieve and of the Pantheon, was born at Paris, Sept. 4, 1711. He studied at the College de Senlis, then belonging to the Regular Canons of the *Congregation of France*, vulgarly called the Genovefains, into whose society he entered in 1727. He had originally devoted himself to the study of divinity, of which he was elected a professor at the age of 24, before he had even taken priests' orders; but the troubles which afterwards arose on the subject of Jansenism, obliged him to abdicate. On the establishment of an academy at Rouen, in 1748, Pingré was chosen a member; and an astronomer being wanted, Pingré was appointed to take the charge of this department. From that period his reputation, as an astronomer, became universally established. His death happened on the 12th of May. He is succeeded in the institute by Cit. Jeaurat.

Jean Dominique Cassini IV, was born in 1748. In 1796, he retired into the country: he has been replaced at the board of longitude by Cit. Messier, and in the institute by Bory.

Don Antoine de Ulloa died, at the advanced age of 80, at Cadiz, in June, 1795. This is the same astronomer, who, conjointly with Godin, Bouguer, and Condamine, was commissioned, in 1736, to measure a degree in Peru; on which important subject he published a work, in three volumes in quarto, in 1793. ~~He~~ was one of the most zealous patrons of astronomy in Spain, and contributed greatly

greatly to the construction of an observatory at Cadiz. His great merit and experience procured him great reputation and influence in Spain.

We have likewise lost, with the commencement of 1795, Don Vincent Tosino, and Don Joseph Varela, officers in the Spanish marine; one of whom died at Cadiz, the other at Vera Cruz. They were conjointly occupied with making observations at Cadiz, of which they published two interesting volumes in 1776 and 1777. Cit. Delambre has calculated many of these observations, which have proved highly useful. They afterwards engaged in preparing a chart of the Spanish coasts, which appeared in 1786.

In America, astronomy has suffered a loss, by the death of M. David Rittenhouse, born in 1729. This gentleman built an observatory at Pennsylvania, and published several astronomical observations. But being in a public capacity, as treasurer of the province, and afterwards comptroller of the mint, he had little leisure for pursuing his astronomical researches.

In France, we have lost citizen Fortin, professor of mathematics at Brest, who made many valuable observations in that city, whilst in possession of an observatory.

The Chevalier Lorgua, who died at Verona, 28th June, was one of the most eminent geometers of the age. He founded an Italian society, of the transactions of which he has published seven volumes, each volume containing a great number of astronomical memoirs. Lorgua has bequeathed a very liberal sum to support this institution, and may be considered as one of the most active patrons of astronomy.

In England died within the year, Dr. A. Shepperd, professor of astronomy at Cambridge. He was born in Westmoreland in 1742. His correspondence was active and instructing; he possessed a large and well-selected library, and being a man of property, contributed with his fortune to the progress of astronomy. He built, at his own expence, an observatory at Cambridge, which he furnished with the necessary instruments, and being a member of the Board of Longitude, he had frequent opportunities to assist, as well the science of astronomy itself as its votaries. He published, in 1772, his grand tables for correcting the distances observed at sea, and in general took an active part in every useful enterprize, and contributed richly to its success.

For the Monthly Magazine.

ON MEDALS.

*Quod non imber edax non aquilo impotens
Possit diruere, ont innumerabilis
Annorum series, & fuga temporum.*

HOR.

"The medal faithful to its charge of fame,
"Thro' climes and ages bears each form and name:

"In one short view subjected to our eye,
"Gods, emp'rors, heroes, sages, beauties, lie."

POPE'S EPIST. TO ADDISON.

THE art of stamping money, or impressing it with a certain mark, image, or figure, is a very early discovery, and seems to have been known in the rude infancy of society. Without tracing it to TUBAL CAIN, with the learned but fantastical VILLALPANDAS, certain it is, that the ancients cultivated this invention with uncommon success, and that

"The sacred rust of twice ten hundred years,"
is no hyperbole. Long anterior to that epoch, the business of the mint was carried to higher perfection than what it is at this very day.

No sooner had liberty unfurled her banners in Greece, than the arts were cherished and esteemed. It was then that the finely-cultivated taste of antiquity was displayed in all its lustre, and kings attempted to emulate the grandeur of free states. Athens displayed her unrivalled excellence on her coins, while Sparta, less polished, but, perhaps, more wise, true to the maxims of Lycurgus, banished the precious metals from Laconia, and substituted iron * in their stead.

The Macedonian princes, in imitation of the neighbouring republics, produced a fine series of medals, which are in high estimation at this day. Syracuse, founded by a colony from Corinth, and, by turns, a commonwealth and a monarchy, as virtue and vice predominated among the people, excelled in the numismatic art, and, perhaps, the finest coins now extant, were struck with the Sicilian die.

Rome too, after the expulsion of the Tarquins, cultivated the fine arts, although with inferior success, and never until the day that her perjured general crossed the Rubicon, and assumed the imperial

* The Belgick Britons, according to Cæsar, seem to have done that from necessity which the Spartans did from choice: "Utuntur aut ære, aut annulis ferreis, ad certum pondus examinatis, pro nummo." De Bell. Gallico, Lib. v. § x.

purple, was the money of that republic sullied with the image of a mortal.

An age of polished fervility, followed by a long night of Cimmerian darkness, succeeded. Tiberius, Nero, Caligula, those deified monsters of the moral world, whose claim to the godhead seems to have been founded on the excess of their crimes, assumed on their coins all the symbols of divinity. Christianity too, no longer crawling meekly on the earth, but with her foot fixed on the neck of prostrate Paganism, converted the Augur's *lituus* into the Bishop's crozier, &c. borrowed the *nimbus*, or glory, with which the heads of the eastern emperors were arrayed, in order to adorn her saints, and irradiate her gods *!

At length, literature and the arts, which had been rooted up by the barbarians, revived together, and Europe beheld with astonishment a prince†, seated on the throne of superstition, by a strange fatality, encouraging those very pursuits that were destined to shake priestcraft to its centre.

Louis XIV, imitating Augustus in a *protecting despotism*, like him, cherished genius, and, like him too, found it ever ready to court the smiles and lick the feet of that very tyranny which it was doomed so speedily to subvert. The vain-glory of this prince supplied a liberal patronage to the arts: his numerous dies, which form, as it were, a *medallic history* of his reign, display, however, all the fantasticalness of despotism; for we behold him, at one time, striking a superb medallion on the junction of the ocean and the Mediterranean, and, at another, eternizing the revocation of the edict of Nantz. In 1683 he records his just vengeance on Algiers, and celebrates the recovery of his subjects from slavery; in 1686, he perpetuates the discovery of the satellites of Saturn; while, in 1685, he tells posterity, that a tyrant king of France was base enough to make the first magistrate of a free state supplicate, in person, his forgiveness†.

* The ancient sympulum, from which the libations were poured out on the heads of the victims, in the temple of Jupiter, seems to have been converted into the *benetier*, or holy-water pot of modern times.

† Leo X.

‡ As the five medals alluded to are now before me, I shall transcribe the mottos, &c.

No. 1. *Subject*.

Neptune smiting an Isthmus with his trident, and forming an Union between the Seas.

Legend.

MARIA JUNCTA.

The effeminate and dissolute reign of Louis XV, added but little for the pen of the historian, the pencil of the painter, or the *burin* of the engraver; and yet all these were employed to flatter his vanity and sooth his pride.

The age of Louis XVI, is that of political *miracles*. The American revolution was but the forerunner of others infinitely more important. On this occasion was struck one of the finest medals that modern times have witnessed. I shall here describe it from a specimen lately in my own possession, but now appertaining to Professor Ogilvie, of King's College, Old Aberdeen. On the face is a busto of a beautiful maiden, with her tresses floating in the wind. The head surmounted by the *cap of liberty*, suspended at the end of the *vindicta*, or rod, used by the Roman magistrate on enfranchising a slave:

"*Hæc mera libertas: hanc nobis pilea donant.*" PERS. SAT. 5.

famulusque jugo laxatus herili

Ducitur, & grato remeât securior ictu.

Tristis conditio pulsata fronte recedit:

In civem, &c.

CLAUD.

Exergue.

FOSSA A. GAR. AD.

PORT SETIUM

M.DC.LXVII.

No. 2. *Subject*.

Religion (Superstition) planting a Crucifix on the desolated Altars of the Hugonots, or Protestants.

Legend.

RELIGIO VICTRIX.

Exergue.

TEMPLIS CALVINIANORUM EVERSIS,

M.DC.LXXXV.

No. 3. *Subject*.

France releasing her captive Citizens with one Hand, and terrifying a Figure in a Turkish dress, by means of the Medusa's Head on her Shield, which she upholds with the other.

Legend.

CIVES A PIRATIS RECUPERATI.

Exergue.

ALGERIA FULMINATA,

M.DC.LXXXIII.

No. 4. *Subject*.

Saturn surrounded by his Satellites.

Legend.

SATURN. SATELLITES PRIMUM COGNITI.

M.DC.LXXXVI.

No. 5. *Subject*.

The Doge of Genoa holding his ducal Crowns in his Right Hand, soliciting the Forgiveness of Louis XIV.

Legend.

GENUA. ORSEQUENS.

Exergue.

DUX, LEGATUS ET

DEPRECATOR.

M.DC.LXXXV.

Legend.

Legend.

LIBERTAS AMERICANA.

Exergue.

4 JUIL. 1776.

The reverse exhibits (monarchical) France, attired like Minerva, presenting her Shield, with the Gallic Lilies in the Field, to an affrighted Leopard, under which Emblem Britain is insultingly typified, while, with the Right Hand, she is prepared to bury her Spear in his Side.

Below this vaunting Figure is a young Hercules strangling the Serpents that had assaulted his Infancy. This allusion respecting America must be allowed to be appropriate.

Legend.

NON SINE DIIS ANIMOSUS INFANS.

Exergue.

17. 1777.

Oct.

19. 1781.

Much about the same time the French school of engraving was occupied in celebrating the worthies of the American Revolution, &c. two of its best artists were actually busied by command of the court, in tracing for posterity the features of a Virginian Planter, and a Printer of Philadelphia; Washington the supporter, and Franklin the founder, of American Independency!

From admiring the heroes of freedom in another country, and imitating them in our own, the step is inconsiderable. At length, in 1789, liberty was proclaimed in France, by the States-General, with the assistance of the people of Paris, who nobly seconded the endeavours of the representative body, and sealed their patriotism on the ruins of the Bastille.

The convulsion that succeeded, uprooted the monarchy from its foundations, and has imposed a new face on the affairs of Europe.

The arts have been called in to eternize the most celebrated epochs of Gallic freedom, and will find full employment for a century to come, in recording the victories of an infant commonwealth, which, in its very cradle, has smote the adult and decrepit despotisms on the continent with a deadly vengeance.

Here follows a description of a few of the medals which have been struck subsequent to the Revolution.

No. 1. Obverse.

A Portrait of the Citizen of Geneva, Author of the Social Contract.

Legend.

J. JACQUES ROUSSEAU, né A GENEVE, en 1712.

Reverse.

Two circles. The inner one contains the following Inscription:

LA PUISSANCE
LEGISLATIVE,
APPARTIENT AU PEUPLE
ET NE PEUT APPARTENIR
Qu'à LUI.

The outer Circle contains the Book and Chapter of the Social Contract, whence the text has been borrowed, viz.

CONTRAT SOCIAL

Liv. 3.

Chap. I.

The Artist is

M. DUMAREST.

This medal was struck at Birmingham, by the newly invented balance-press of the ingenious

Mr. BOLTON.

No. 2. Obverse.

A half-length figure of a gallant Officer, who, after participating in two Revolutions, languished until lately in one of the Dungeons of Moravia.

Legend.

LAFAYETTE Deputé

A L'ASS. NAT.

CONSTITUANTE.

Né en 1757.

Reverse.

Two Branches of Laurels, tied at the ends and meeting at the top, after inscribing a Circle.

Within this civic Wreath, is the following Inscription:

IL A COMMANDE
LA GARDE NATIONALE
PARISIENNE EN 1789
1790 et 1791.

The Artist is the same as the former.

No. 3. Obverse.

The National Parisian Guard, and the Deputations from all the armed Citizens of France, swearing Fidelity before the Altar of Liberty.

Legend.

VIVRE LIBRES

OU

MOURIR.

Above the Banners are the Words

PACTE FEDERATIF.

Below, in the

Exergue,

14 JUILLET.

1790.

Reverse.

REVOLUTION FRANÇAISE.

1792.

The Artist is

M. DUFRE.

No. 4. Obverse.

Louis XVI. dressed in his Coronation Robes, swearing to observe the Constitution, Before him

him frands France arrayed like Minerva, with her Left Hand on the Laws. She is supported by Justice, who displays her usual Attributes. The Altar of Liberty is decorated with the Roman Fasses, surmounted by the Cap of Freedom, and encircled by a Garland of Oak.

The Legend.

Consists of the Royal Oath, which was as follows:

JE JURE
D'ETRE FIDELLE A LA NATION
ET A LA LOI.

Reverse.

Within the inner Circle is the following Inscription:

LE VŒU
DU PEUPLE N'EST
PLUS DOUTEUX
POUR MOI.
J'ACCEPTE LA
CONSTITUTION.
13. SEPTEMBRE
L'AN. III. DE LA
LIBERTE.

Within the outer Circle we find that this was

Message Du Roi
A L'ASS. NAT. CONST.
President JES. GME. THOURET.

No. 5. Obverse.

Liberty seated on a Cube, upholding the *Pileum*, or the Cap, with her Right Hand, while her Left leans on the Table of the Law, inscribed

DROITS DE L'HOMME.

Article V.

Behind her is the Gallic Cock standing on a fluted Column, in the Act of Crowing.

Legend.

LIBERTE SOUS LA LOI.
Exergue.
L'AN. II. DE LA LIBERTE.
Inscription on the Reverse.
REVOLUTION FRANÇAISE,
1792.

No. 6. Obverse.

A Hercules attempting in vain to break a Bundle of Rods.

Legend.

LES FRANÇAIS UNIS
SONT INVINCIBLE.

No. 7. Obverse.

Hercules breaking a Sceptre, and trampling on the Ensigns of Royalty.

Legend.

LA SAGESSE GUIDE SA FORCE,

Exergue.

LA FIN DU
DESPOTISME.

Reverse.

A Pyramid.

Legend.

REPUBLICA GALLICA,
ANNO I.

Exergue.

ÆRE PERENNIS
1792.

To the Editor of the Monthly Magazine.

SIR,

THE following description of the Marine School at Amsterdam, is taken from the MS. journal of the Travels of THOUIN into Belgium and Holland, part of which was lately copied into the *DECADE*, a periodical publication of Paris. I think it calculated to inform, or gratify, the intelligent readers of your valuable Miscellany, and highly to deserve the attention of the British nation at large.

This republican seminary, in which the stadtholderian government took no sort of concern, but surveyed with distrust and displeasure, owes its origin, like the greater part of the most interesting establishments of Amsterdam, to the public-spirit of individuals, who subscribed at first towards its erection, and now contribute annually a certain sum, in proportion to their means, towards its support. Its object is to form a number of expert sea-officers, capable of rendering service to the commerce and naval-tactics of their country.

"It was M. Teyffet, vice-president and secretary of the establishment," says Thouin, "who introduced us into the house, and made us acquainted with every part of its economy. He informed us, that it was founded in 1785; that it commenced with twenty-five scholars, whose number had gradually encreased to 150, the present establishment: that it had already furnished the mercantile marine with sixty excellent seamen; and that several other *élèves* were now about to proceed on board the vessels of the republic equipping for the defence of the States.

"These *élèves* are taken from among the children of citizens of all conditions, from the age of seven years to that of twelve. Here we see the sons of opulent merchants, those of superior officers, of governors of colonies, classed along with the children of simple street-porters, and common sailors. These last are instructed, &c. gratis; the others are required to pay a small board of twelve florins per month; all, however, are clothed, fed, and taught, in the same manner, without any distinction of treatment whatever.

"The objects of instruction, are the mathematics, astronomy, design, and the living languages of those nations with whom commercial intercourse is the most frequent. The pupils are also exercised to the working of a ship, in all its parts, and in every possible circumstance wherein it

it may be found; to the management of great guns and small arms; to the use of the sails, rigging, and even to the refitting and caulking vessels, &c. so that this apprenticeship will equally qualify the learner to conduct a ship, to repair it in case of need, and to defend it.

"Since the first institution of the seminary, only five pupils have died; of whom one perished by a fall from the top rigging of the ship; two died by the small-pox, and two others by ordinary diseases.

"Their apparel is very simple, attended with little cost, yet commodious. It consists of worsted stockings, shoes tied with strings, large breeches, and a short sailor-like jacket, made of grey linen cloth for the summer, and of wool of the same colour for the winter. They wear also a kind of red surlout, very short, which they put over their other clothes, when they perform their exercises, or go out of the house. Their hats are round, and made of good black felt, with a blue ribbon about them, on which was an inscription in Dutch, which I did not understand," says Mr. Thouin, "and consequently did not retain.

"With regard to their board, they breakfast regularly on water-gruel; at dinner, they have soup, potatoes, stock-fish, bread made of a mixture of rye and corn, butter and cheese. For a change, they are served twice a week with peas, beans, and kidney-beans, lentils, fresh meat, beef or mutton, and vegetables, according to the season; the supper is always the same as the dinner; and, at all their meals, they are allowed as much beer as they call for.

"They sleep in hammocs suspended to the ceiling of a large dormitory, which dormitory resembles the interior structure of a ship; in these hammocs are a mattress, a hempen sheet, and a worsted coverlet. To make the illusion more complete, under every hammoc is a coffer, like those the marines have when at sea to stow their baggage in. These coffers serve them for a wardrobe, for a seat; and are also used to tuck up the hammocs every morning to the ceiling, and to untie them at night.

"The house is very simple, being an oblong square, with four stories; every story comprises a large plot, distributed after different manners.

"On the ground-floor, which is ~~for~~ ^{at} what lower than the level of the court, are magazines for such articles as are not liable to be damaged by moisture; a place

to perform the exercises with small-arms, culinary offices, and the refectory.

"On the first story, comprising half of its length, is a hall, in which the scholars write, read, design, and study. The other half is used for the dormitory above mentioned; here the hammocs are suspended at a small distance from each other, and underneath them, are the coffers, with locks and keys, which contain their apparel.

"The second story is divided into separate chambers; of these, one is used for an infirmary, containing ten good beds with very white linen, and other very neat furniture; the other is a dispensary, not overloaded with drugs, but plentifully furnished with excellent cordials, honey, sugar, and jellies of different fruits, acid and savoury.

"Next to these two rooms, are the apartments of the officer of health: they are curious, and convey a respectable idea of the person who occupies them. Exclusive of his own furniture, &c. which is simple, and remarkably neat, we find a handsome library, and a glazed cupboard, containing an assortment of anatomical preparations, of bones diseased and fractured, in different ways. Beside them are placed instruments of surgery, preserved with great neatness. In short, it is difficult to arrange within so small a compass so many useful and well-selected articles. The young man who possesses them, either is or will certainly become a man of merit.

"On the same story is a space appropriated to the exercise of great guns. The manner in which this is performed is ingenious; on the walls are figured a portion of the side-planks of a large ship of the line, in which is a port-hole with a real cannon of the usual dimensions; the flooring here resembles that of a ship; facing the mouth of the cannon, and at one end of the hall, is the white mark, or point of aim, to which the piece is directed. The pupils are superintended by a skilful cannoneer, who trains them to the exercise. On a given signal, four of them drag the cannon out of its port-hole, another stops and places it; one puts in the cartridge, another the wadding, a third points it; a fourth opens the port-hole, a fifth directs the aim, and a sixth sets fire to the priming. As taking aim is the most important part of the process, every time that the pointer has adjusted his piece in the usual way, to ascertain whether it is well directed towards the point of aim, a plug which occupies the breech

is removed; by this means, by directing the view into the interior of the bore of the cannon, and the white mark being of an equal diameter, or even somewhat less, it is easy to pronounce whether the piece is exactly adjusted. This very ingenious mode of ascertaining the direction of cannon, is a saving in powder, and answers the same purpose of actual firing.

"The third story is occupied with magazines of comestibles, furniture, and utensils of every kind, kept with much regularity and the greatest neatness.

"The fourth story is laid out in granaries, lofts, &c. the workmanship of which, though very slight, is solid, and made like joiner's work.

"Above the whole building is a platform nearly fifteen feet square, used as an observatory for instruction in astronomy; in this is a quadrant, a clock, and a telescope. From this point of view the eye can extend over a considerable part of the city, over the port, which displays a forest of masts terminated by streamers of all colours, over the Zuyder See, over a part of North Holland, and a vast extent of the canal which passes to the Texel. This view is extremely rich and highly magnificent.

"On entering the house, we were conducted, by the vice-president, and some of the instructors, into an upper parlour, where the governors hold their meetings. According to the custom of the country, Malaga wine was brought us, together with biscuits, tea, and pipes. In this room we observed the portraits of the admirals Tromp, father and son, of De Ruyter, and other seamen distinguished by the services they had rendered to their country.

"We then descended to the ground-floor, where the pupils went through the exercise of the fuzee, and the military evolutions. They perform their manœuvres with precision, although with less promptitude than our volunteers. From thence we passed into the court-yard, where we were entertained with a spectacle we did not expect:—a three-masted vessel, completely furnished with rigging, sails, &c. It was mounted as if afloat, that is to say, its prominence above the ground was equivalent to the height it would gain in swimming over the water. On the decks were sixty of the pupils, divided into three groupes. At the voice of their commander, placed on an elevation pretty near, they all fell into motion, climbing the masts without confusion, dispersing themselves over the

rigging, top-masts, yards, &c. and waiting on their position till the second word of command. They were then ordered to loosen the sails, to hoist them, and to spread them to the wind. They now descended on the deck, and the vessel remained rigged during some seconds; soon, however, a fresh signal was given, to brail up all the sails. This operation, which appeared to me to be more troublesome than the former, was performed with great order. In seeing these young persons climbing up, like cats, to the tops of the ship, curve their bodies, and place themselves in equilibrio, on moveable pieces of timber, I could not but admire their address and agility, yet was continually in fear lest some or other of them might fall: I was informed, however, that habit had rendered their exercise no less safe to them than it was easy.

"We next went to visit the school-room, where we found the pupils again collected. I remarked the same gaiety and attachment in their application to all their exercises, and I thought I discovered the reason of this in the patience and good temper of their instructors. In this country it is taken for granted, that tuition cannot be profitable, unless the masters make it their principal study to render themselves beloved by their scholars.

"Their dinner, at which we were present, was to us a spectacle no less agreeable. The tables consisted of long chests, rising to the height of about eighteen inches above the level of the floor. The pupils were placed round about on four benches, with their knees on one side, and their right-hand in front of the table.

"Fifteen of them, that is to say, one for each table, were employed in fetching soup out of the kitchen, which was served up in large vessels (*sibiles*) of wood, very neat. These they carried to their respective tables; after which one of the youngest boys mounted on a bench, and recited aloud a prayer, which was attended to by the rest, bareheaded, and with a religious respect. Every one then sat down and fell to eating, out of his wooden bowl, with a pewter spoon.

"After the soup, another *sibile* was served up, filled with potatoes and stock-fish, with butter sauce poured over them. One of the pupils proceeded to mash this hotch-potch with a spatula, working it into a paste consistent enough to be taken up by a fork. During this preparation, another was cutting slices of rye-bread, which a third (doubtless a geometrician) divided into equal shares,

though very irregular; the cheese was also sliced into as many parts as there were boys sitting at the table. Notwithstanding the science and good faith attributed to the divider of the cheese, the pupils take the following precaution to prevent any collusion in equalling the shares: the pieces counted are laid on the table, are taken up one after another by the divider, who always asks 'whom shall I give this to?' on which one of the youngest, with his back turned to the table, names one of his companions, and so on till the distribution be finished. No collusion can be practised between the divider and the namer, as they do not know their appointments till all are seated at table; the company at large name them every day after the *benedicite*.

"ALQUIER, representative of the people, being with us, called for a glass of beer, and drank to the health of the pupils, and to the prosperity of the Batavian republic; on this all the youths rose up instantly, and, uncovering, exclaimed *Vive la République Française!* One of the younger pupils was then desired to drink a health to the glory of the French republic, upon which all of us Frenchmen who were present, returned the compliment by exclaiming, *Vive la République Batave!*

"The economy which reigns throughout the house is admirable; none are to be seen there, but a very small number of persons necessary to its service; a commandant of marine, a master-gunner, a man to look after the kitchen, and an officer of health. The pupils perform all the domestic service, each one by rotation. Every thing is swept, washed, &c. with extraordinary neatness, so that not the slightest disagreeable scent is to be perceived.

"Their education is entirely directed towards the maritime life, and they are early inured to all the good habits of seamen; their dress is sailor like, their provisions are nearly the same, and their lodging resembles that found on board ships: they work, however, much harder than on board ship, for which reason they are anxious to embark as early as possible, in order to put an end to their education. More than sixty students have already entered into the service of the marine, exciting the greatest hopes of their talents and good conduct.

"With regard to the police of the house, it is managed with great exactness by the instructors, who are obliged to give an account in writing, twice a week, to

the governors, of the behaviour of the pupils, their assiduity in study or labour, and their improvement. The inferior police is administered by the pupils themselves; the punishments being inflicted and executed by some among their own number, whom they appoint for that purpose. A slight fault is punished with the instantaneous privation of the blue ribbon, which they wear in their hats; and a greater one, by the stigma of eating at a table separate from the rest of the company. Such as beat their fellows, are punished by receiving lashes with small cords over their shoulders, running the gauntlet for this purpose through the whole school. Desertion is punished by imprisonment, and greater offences by dismissal from the house; this last is considered as the greatest disgrace possible.

"In the month of August every year, there is a grand vacation throughout the establishment. At this time, such of the pupils as have best discharged their duty, receive encomiums by proclamation, &c. They are moreover invited to drink wine out of a large silver cup, bequeathed to the house for this purpose, by a celebrated mariner.

"In a word," concludes Thouin, "this institution reflects honour on those who founded and support it, as a proper nursery for excellent seamen, useful to the Batavian nation, and tending to accelerate the progress of the sciences."

For the Monthly Magazine.

[The following notice relative to the life and writings of VANDERMONDE, was written in French, by LACEPEDE, secretary to the class of physical and mathematical sciences, in the National Institute, at Paris: and was recited, the 15th Germinal, in the first public sitting of that body.]

VANDERMONDE, member of the National Institute of Sciences and Arts, was born at Paris, in the year 1735. He devoted his youth to self-instruction; and, even at the age of thirty, was far enough from suspecting that he was destined to instruct others in his turn. Chance brought him near to the celebrated Fontaine. That sexagenary geometrician easily divined the progress which VANDERMONDE would one day make in the mathematics; in him he anticipated, as it were, a successor to himself; he patronized and caressed him, let him into the secret of his researches, calculations, inventions, of that lively enjoyment which profound speculation gives to an elevated,

elevated, attentive mind; and which, blended with the sweets of tranquillity, the charms of retreat, and the consciousness of success, becomes often a sort of passion, as felicitous as durable. All that time, Fontaine, whose attention was again directed to the researches which he had added to those of Jean Bernoulli, relative to the then famous question of the *tautocrones*, had the glory to be vanquished only by D'Alambert and Lagrange. Vandermonde, a witness to this combat, necessarily illustrious, animated by the honour which he saw annexed to that glorious defeat, enchanted with the sight of Fontaine, as happy, in spite of his age, from his love of geometry, as a youth of twenty could be with a sentiment less tranquil, thought he should insure his happiness for ever, by yielding to a passion which the ice of age could not extinguish; in a word, he devoted himself to geometry.

His labours, however, were for some time secret; and perhaps the public would never have enjoyed the benefit of any of his works, if another geometrician (whose name, says Lapeyre, cannot be pronounced, in this place, without a mixture of interest and regret) had not inspired him with a consciousness of his own strength, and courage to display it. Fontaine had already devoted him to geometry; Dusejour exhorted him to penetrate even into its sanctuary. In brief, he presented himself to the Academy of Sciences, into which he was admitted, in 1771; and, in that very year, justified the suffrages of his associates, by a paper which he published, relative to the resolution of equations.

From the sixteenth century, the method of resolving equations of the four first degrees has been known, and since that time the general theory of equations has received great improvements. In spite, however, of the recent labours of many great geometricians, the solutions of equations of the fifth degree had in vain been attempted. Vandermonde wished to consolidate his labours with those of other illustrious analysts, and he proposed a new theory of equations, in which he seems to have made it particularly his business to simplify the methods of calculation, and to contract the length of the *formulae*, which he considered as one of the greatest difficulties of the subject.

This work was quickly followed by another, on the problems called by geometricians *problems of situation*. It seems to have been the destiny of Vander-

monde, as well as of Fontaine, who first initiated him into the mysteries of mathematical science, to labour frequently upon subjects already handled by the greatest masters. In his first memoir, he had started, so to speak, in competition with Lagrange and Euler; in his second, with Euler and Leibnitz. This last was of opinion, that the analysis made use of in his time, by the geometricians, was not applicable to all questions in the physical sciences; and that a new geometry should be invented, to calculate the relations of positions of different bodies in space; this he called *geometry of situation*. Excepting, however, one application, made by Leibnitz himself, to the game of *solitaire*, and which, under the appearance of an object of curiosity, scarcely worthy the sublimity and usefulness of geometry, is an example for solving the most elevated and important questions; Euler was almost the only one who had practised this geometry of situation. He had resorted to it for the solution of a problem called the *cavalier*, which, also, appeared very familiar at first sight, and was also pregnant with useful and important applications. This problem, with the vulgar, consisted merely in running through all the cases of the chess-board, with the *knight* of the game of chess; to the profound geometrician, however, it was a precedent for tracing the route which every body must follow whose course is submitted to a known law, by conforming to certain required conditions, through all the points disposed over a space, in a prescribed order. Vandermonde was chiefly anxious to find in this species of analysis a simple notation, likely to facilitate the making of calculations; and he gave an example of this in a short and easy solution of the same problem of the cavalier, which Euler had rendered famous.

His taste for the high conceptions of the speculative sciences, as blended with that which the *amor patriæ* naturally inspires for objects immediately useful to society, had led him to turn his thoughts towards perfecting the arts conversant in weaving, by indicating a manner of noting the points through which are to pass the threads intended to form the lines which terminate the surface of different regular bodies: accordingly, a great part of the above memoir is taken up with this subject.

In the year following (1772) he printed a third memoir; in which he traced out a new path for geometers, discovering, by learned analytical researches, *irrational* quantities

quantities of a new species, shewing the sequels of which these *irrationals* are the terms or the sum, and pointing out a direct and general method of making in them all the possible reductions.

In the same year appeared his work on the Elimination of unknown Quantities in Algebra. This elimination is the art of bringing back those equations which include many unknown quantities, to equations which only contain one. The perfection of researches in this art would consist in obtaining a general and particular *formula* of elimination in a form the most concise and convenient, in which the number of equations and their degrees should be designed by indeterminate letters. Vandermonde, while he considered the geometers as very distant from this point, had some glimpse of a possibility of reaching it, and proposed some new methods of approaching nearer it.

In 1778, he presented, in one of the public sittings of the academy, a new System of Harmony, which he detailed more fully in another public sitting of 1780. In this system, Vandermonde reduces the modes of proceeding adopted until his time, to two principal rules, which thus become established on effects admitted by all musicians. These two general rules, one on the succession of according sounds, the other on the arrangement of the parts, depend themselves on a law more elevated, which, according to Vandermonde, ought to rule the whole science of harmony.

By the publication of this work he satisfactorily attained the end he had proposed to himself, and obtained the suffrages of three great men, representatives, so to speak, of the three great schools of Germany, France, and Italy: Gluck, Philidor, and Piccini*.

With these labours, intermingled with frequent researches on the mechanic arts, as well as on objects of political economy, the attention of Vandermonde was taken up; when, July 14, 1789, the voice of liberty resounded over the whole surface of France, and suddenly all the thoughts as well as all the affections of Vandermonde were engaged on the side of liberty†.

* It was reserved for Goussier, one of our associates, to furnish a more solid basis for the rules of harmony, by discovering a series of sounds which nature communicates to such as are determined to ransack her secrets, and the detail of which will equally interest the friends of the physical sciences, and those of the fine arts.

† Some persons have reproached Lacedepede for

He was soon after attacked by a disorder in his lungs, which almost taking away his voice, manifested itself by alarming symptoms, and conducted him by rapid steps to the tomb.

In the mean time, the Representatives of the People sought, by the establishment of Normal Schools, to repair the loss which Letters had sustained, and to open again the sources of instruction throughout the whole extent of the Republic. Vandermonde was hereupon invited to discuss before them the principles of political economy. The little time he had to prepare himself for a work which he had not foreseen, and to collect his scattered meditations on the great interests of nations, the nature of the rostrum in which he was to deliver his sentiments, the feebleness of his voice, the short duration of the school, which deprived him of one of his principal advantages, that of progressing constantly towards his end, all these obstacles concurred to prevent his ideas from being received by a numerous assembly, with the favour which his geometrical works had obtained from isolated readers.

Some time after (says Lacedepede) you admitted him one of your members, and, in spite of the progress of his malady, which became more alarming every day, he was just beginning to fulfil, among his old and new associates, the duties you had imposed upon him, when death suddenly struck him almost within these walls, on the 11th Nivose of 1795. Thus were his last moments, like the rest of his life, devoted to the sciences and the arts.

For the Monthly Magazine.

BIOGRAPHICAL NOTICE RELATIVE TO FLANDRIN, A CELEBRATED FRENCH VETERINARIAN. BY F. H. GILBERT, PROFESSOR-DIRECTOR-ADJUNCT OF THE VETERINARY SCHOOL, AND MEMBER OF THE COUNCIL OF AGRICULTURE, AND OF THE NATIONAL INSTITUTE OF PARIS.

IF the death of a celebrated artist is a public calamity, it is particularly so when he is taken away in the midst of his career, from an art yet in its infancy, and

not having represented Vandermonde as an associate of that atrocious class of men who covered France with the scaffold, with ruins, and crimes. His reason for this was, that, in his opinion, discussions on political opinions ought not to be admitted into the sanctuary of the sciences,

which

which being more solid than brilliant, and less attractive than useful, disheartens by the series of labours to undergo, and of difficulties to surmount, those who are not to be stopped by the prejudices which obstruct its entrance.

Such is the veterinary art, which has lately lost Citizen Flandrin, after thirty years usefully employed in extending the limits of it. He was born at Lyons, Sept. 12, 1752, of parents more distinguished by the purity of their manners, than by their fortune; by the utility than by the dignity of their profession.

It was some years after that epoch, that the establishments destined for the melioration of the art of preserving and curing animals—establishments long called for by the wishes of all the friends of rural economy—the veterinary schools, were set on foot, first at Lyons, and afterwards at Paris.

Citizen Chabert, maternal uncle of Flandrin, charged with an important branch of instruction in one of those establishments, soon after their institution, had then excited great hopes, which he has well realized since, and laid the foundation of the deserved reputation of being the first veterinarian of his country.

Among the services which he has rendered to the veterinary art, we ought not to consider as one of the least important, the having invited to him his nephew, as soon as he judged him capable of profiting by his instructions.

Under the direction of so able and zealous a guide, young Flandrin could not fail to make improvement; this he did so rapidly, that at the age when most other persons make their *entrée* in this course, he was already employed to instruct them, and to conduct their first steps in it.

It was not long ere a wider field was opened to his activity and talents: the direction of the veterinary school at Lyons, which became vacant on the resignation of Rosier. Flandrin was called to it; he there formed many artists who have distinguished themselves by important services, and enriched the anatomical cabinet of the school with a great number of preparations, which attract to it daily crowds of connoisseurs, and all the foreigners who visit that celebrated city.

When citizen Chabert was called, in 1775, to the place of director-general of the veterinary schools, vacant by the death of their founder, De Bourgelat (whose memory would have been honoured by this institution alone, if he had not illustrated it by labours of the greatest importance) Flan-

drin was appointed to the place of director-adjunct, which his uncle had occupied.

Although a stranger to none of the elements, as numerous as diversified, of which the veterinary art is composed, he had particularly devoted his attention to comparative anatomy; experiments on the absorption of the lymphatic vessels, dissertations on the singular conformation of the *farigue* (a species of opossum), on the extent of the retina, and on a pretty large number of other points of comparative anatomy and physiology, evince in their author a very valuable sagacity, and make us regret that he was prevented from executing the project he had conceived of an extensive work on comparative anatomy; a project, immense materials for which he had been a long time laboriously collecting.

The academy of sciences, to which he presented his dissertations, and some excellent observations on madness, gave him, in 1791, *lettres de correspondant*, which were not to him, like so many others, a brevet for inactivity; they neither paralysed his scalpel, nor his pen.

Two journeys undertaken by order of government, one into England, in 1785, and the other into Spain, in 1787, inspired him with a very decided taste for rural economy; the rearing of sheep, in which the English and Spaniards have unhappily an acknowledged superiority over us, had above all fixed his attention. The researches which he made on the management of sheep in those two countries, have become the materials of a complete treatise, which he published in the second year (in large octavo), on the rearing of sheep; a work * the richest in facts that we possess on this subject.

He had already published some works equally useful, but less important in regard to extent: such as a *précis* of the anatomy of the horse, a *précis* of the exterior knowledge of the same animal, and a memoir on the possibility of meliorating horses in France.

The *Journal de Médecine*, the collection of memoirs of the Society of Agriculture, of Paris, of which he was a member, the papers called the *Cultivator*, the *Mercur*, the *Journal de Paris*, and many other periodical publications, contain a great number of dissertations and letters of

* In this, a notice, very well drawn up, has been inserted (by Huzard, the editor), of all the authors who have written on the same subject; a notice very interesting to such as devote their attention to researches of this kind.

Flandrin, on different subjects of the veterinary art and rural economy.

Associated with citizens Chabert and Huzard, in the editing a collection of instructions and memoirs on the veterinary art, he inserted in it many interesting articles, which have contributed to give to that work the reputation it has acquired with veterinarians and cultivators, of whom it is become, in some sort, the manual.

No art is more liable to shorten life, than that of contemplating organization in animals deprived of it. Plunged continually in an atmosphere loaded with putrid vapours, Flandrin early saw his health decaying, without losing his inclination for the labours which destroyed it. Attacked, about a year before, with a fever which had resisted all the means employed to get the better of it, his exhausted strength could not support the violence of a very acute peripneumony, which, in a few days, took him away from a beloved wife, from children in tender age, from an uncle who had for him the sentiments of a father, from his friends, from the National Institute, which had just admitted him an associate; in a word, from the veterinary art, the regrets of which it is the more incumbent on me to express, as I am called, in some measure, to perpetuate its sentiments, by my insufficiency in the exercise of the functions which he discharged with so much distinction.

To the Editor of the Monthly Magazine.

SIR,

THE extraordinary and affecting manuscript-writing of the unfortunate stranger found drowned in Sea-Mill Dock, which I transmitted to you last month, having very probably excited the attention and sympathy of many of your numerous readers, I feel it a duty incumbent upon me, to lay before them (through the channel of your useful Publication) some information which I have since been enabled to procure of this unhappy and extraordinary person.

A few days previous to the publication of your Magazine, I caused a paragraph to be again inserted in the Bristol newspapers, requesting the attention of the readers to the personal description of the stranger found drowned at Sea-Mill Dock, and inviting the two women, who had made enquiries after a stranger that was missing, and answering the same description, to come forward with their information, as the only probable means left of tracing out the name and connections of this unfortunate stranger. I was soon after waited on by two gentlemen, of Bristol, of the name of Ring, the proprietors of a large pottery, whose information and description of a person lately come to Bristol, and who worked in their ma-

nufactory, in the art of painting China, so exactly corresponded with the clothing and person of the man found drowned at Sea-Mills, that there remained not a doubt of his being the person the subject of their enquiry. Through their polite assistance, I obtained the name of the deceased, which is James Doe, and I also got an interview with the K—f—m acquaintance, who having visited the tenement, and viewed the manuscript-writing there upon the wall, recognized the hand-writing of his friend; he gave me likewise a description of his person and dress, which corresponded with that already published. For particulars of the deceased's family and friends, I was referred to several persons in London, one of whom, a respectable proprietor of a pottery there, writes thus:

"SIR,

"I received your's, and was much affected at its contents. I should have written sooner, but I wished first to see his uncle, who has informed me of the following particulars: "James Doe was born at Lambeth, in Surrey, of very respectable parents, and was educated in the same place. He served an apprenticeship, at Lambeth, to a painter in the China and earthen-ware line, and he painted in the biscuit before it was glazed. In this line he was esteemed a good workman, and, to my own knowledge, he worked some years at Mr. Wedgwood's manufactory, in Staffordshire. He was there very much respected by his employer, his fellow-workmen, and by all who knew him. He was fond of company, but I do not remember him to neglect business when urgent. Having a tolerably good education, he was fond of reading. He was particularly generous, and always first to relieve any of the trade out of employ, or in sickness. He worked at Mr. Baddely's, in Staffordshire, for six or seven years, and was, at that place, very much respected. In fact, I believe him to be generally beloved and respected wherever he worked. About three years ago, he came to London, and finding little or no employment in the line in which he was brought up, he was obliged to leave town, and, being assisted by his friends, he embarked on board a ship for Newcastle, and from thence went on to Glasgow, in Scotland, where he was a fellow-workman with one of my present journeymen, and supported an excellent character there. From this time, I believe, he met with many disappointments. He then went to Ireland, and, after stopping there a short time, he embarked on board a vessel bound for Swansea, in South Wales, where he worked some time, and then went on to the Worcestershire China Manufactory, which was, I believe, the last place he worked at."

Another of the deceased's friends writes thus:

"SIR,

"Your's I received, and am sorry to hear of the melancholy account of James Doe. I have known him and his relations for several years."

" years. He has an uncle, a brother, and
 " two sisters living. His acquaintance with
 " the person he mentions in his writings upon
 " the wall, has been, I believe, of eighteen
 " or twenty years' standing. He was always
 " forward in performing acts of friendship to
 " his fellow-workmen, and was a truly good
 " man to his neighbours. I have conversed
 " with a particular friend and old acquaint-
 " ance of the deceased, who is acquainted with
 " every circumstance and the whole course of
 " life of this extraordinary man; and he is
 " collecting every information he can, which he
 " will send you, in a letter, in a few days,

" I am your's," &c.

The following is an extract from the letter alluded to:

" SIR,

" London, Nov. 20, 1797.

" You seem to be very anxious concerning
 " the life of the unfortunate stranger found
 " drowned in Sea-Mill Dock. You have
 " a right to know it, for the kindness you
 " have shown to his unfortunate remains.—
 " James Doe was born at Lambeth, about two
 " miles from London, of honest parents, who
 " brought him up in as creditable a manner as
 " their circumstances would admit. At the
 " age of fourteen years, or thereabouts, he was
 " put as an apprentice to Mr. Griffiths, at
 " the delft pottery, High-street, Lambeth.
 " When he was out of his time, he continued
 " working at his business until it became slack;
 " and the queens-ware meeting with great en-
 " couragement, he went into Staffordshire for
 " employment, where he remained upwards of
 " twenty years, working for different masters,
 " and then came up to London, in want of
 " employ, and got work at China-gilding for a
 " few months. He was then invited into
 " Staffordshire again, where he remained but a
 " short time; and from that time he has been
 " considered as the wanderer of the trade. He
 " was the most charitable man I ever knew;
 " and he was often known to neglect himself
 " when misfortunes came on his friends and
 " acquaintances, to whose relief he contributed
 " both time and money, as much as lay in his
 " power. Believe me, sir, you have bestow-
 " ed your trouble on the remains of a very
 " good-hearted man.—The acquaintance he
 " alluded to in his diary, and another person,
 " were going to France, about thirteen years
 " ago, with a view of carrying over and esta-
 " blishing there the queens-ware manufactory;
 " some of the master potters heard of it, and
 " had them confined in prison: as soon as
 " James Doe heard of it, he went through
 " the trade to gather money to support his
 " friend, and to preserve him from want; and
 " he, poor soul, contributed all he had, for that
 " purpose. To be denied assistance by that
 " man, whom he had relieved in distress, was
 " too great for his tender heart to bear. Sir, I
 " do not pretend to hold my friend up to per-
 " fection, the last action of his life is against

" him; but I believe, the denial of relief by
 " that man whom he had served and relieved
 " in distress, was the sole cause of his commit-
 " ting the rash act of suicide. The language
 " of the manuscript-writing is nearly the same
 " as his last conversation with me, as far as this
 " friend is mentioned. I perfectly agree with
 " you, that he was in his senses as much as he
 " ever was in his life, when he committed the
 " act of suicide. He was acquainted with a
 " Mr. Greenwood, in Staffordshire, for some
 " years, a man remarkable for fine knowledge;
 " to that man the unfortunate Doe owed a great
 " deal of his knowledge; and although Mr.
 " Greenwood was a very sensible man, yet he
 " held it just for a man to destroy himself, and,
 " like my friend, in his perfect senses, actual-
 " ly made away with himself the day before
 " he was to have been married to a person of
 " credit and property. They are two of the
 " strangest suicides I ever heard; and had
 " James Doe written to his friends in London,
 " he would have had money sent him; for
 " his friends in London would have thought it
 " a happiness to relieve him. He was a very
 " useful man in the Staffordshire-ware manu-
 " factory, as he had studied the chemical
 " secrets of that business. He was fond of
 " reading. I shall be happy in communi-
 " cating any farther particulars you may re-
 " quire; and am, sir,

" Your's," &c. &c.

To the information contained in the afore-
 going letters, I beg leave to add, that I have lately
 conversed with several persons that knew the
 deceased in Dublin, in Staffordshire, at Wor-
 cester, in Swansea, and near Exeter; they all
 unite in one general opinion: viz. that he was
 an excellent workman, was universally beloved
 by all ranks of his fellow-workmen, that he
 possessed a charitable and humane heart, and
 was ever ready in assisting his fellow-creatures
 in distress. He came to Bristol early in Au-
 gust, and immediately visited his friend men-
 tioned in his writings. I have traced him to
 his friend's house, where he spent three or
 four days and nights immediately before drown-
 ing himself. From a very particular and cir-
 cumstantial enquiry into the conduct and
 deportment of the deceased, even to the
 very morning of Sept. 11, I do not find there
 was any the least mark of insanity about him;
 neither was he involved in debt, excepting
 ten or twelve shillings at his lodgings. It may
 then be asked, what motives could induce this
 person to destroy himself? Enjoying full health,
 and possessing an art by which he could obtain
 a competent and perhaps genteel livelihood, he
 had the means of providing for himself, and
 rising superior to want. We must therefore
 let him speak for himself. He says " If my
 " — acquaintance had become my friend,
 " he might have saved me from an untimely
 " death." And again, " How often does
 " sympathy soften one's sorrow, and, with the
 " aid of a little pecuniary assistance, restore an
 " unfortunate

"unfortunate being to industry and repentance." To show also how much this friend engrossed the secret thoughts of his heart, even in his dying moments, after quitting the tenement to drown himself, he first stepped into the ground-floor of another tenement, and wrote the following lines: "O Lord! how weary I am of life! If my acquaintance should happen to see this writing, he will remember, perhaps, the hand of an old former acquaintance."

"Despair pervades my soul—to death I fly for relief."

Here then is the testimony that this unfortunate person has fallen a victim to disappointed friendship and despair. The sweetest and most engaging pleasures of life are those which spring from our social connections; and let those who are joined in the bonds of particular friendship, be solicitous not to break off so delightful an union. A true friend is one of the most valuable blessings this life can bestow; and what greater satisfaction can we experience, than that which arises from our being connected with one to whom we can safely disclose the most secret thoughts of our hearts. Yielding then to the benign propensity of returning a generous and a good action, and bestowing a small bounty on an old friend in distress, might have been the means (in the present case) of saving a soul from death; whereas, on the other hand, if the base and unfriendly conduct of persons whom we have once loved, dissolve all the bonds of amity and friendship, and show our confidence has been abused, then are opened some of the deepest springs of bitterness in the human heart. If the unsuspecting friend be deserted in the hour of distress by the friend in whom he trusted; or in the midst of his misfortunes meets with cold indifference, where

he expected to find the kindest sympathy, and where the heart is sickened and wounded by the ingratitude or faithlessness of one on whom it had leaned the whole weight of affection, where shall it turn for relief?

I hope, Mr. Editor, there is not to be found an advocate for suicide. A heart impressed with a religious fear will say, "How can I commit this great evil, and sin against God?" The Christian religion teaches us to support ourselves with fortitude under all our misfortunes and trials. From hardships and difficulties we derive an experience and steadiness, which teach us to act with propriety in the stations wherein Providence has placed us. It is our duty to acquiesce in what is allotted us; and our sole concern to acquit ourselves well in our respective stations, and sustain well our characters upon this stage of life. Every one, therefore, ought to be satisfied with his portion, and, instead of repining at the more liberal allotments of his neighbour, should be grateful for his own; for the wisdom of the supreme Ruler of the world alone knows what is most conducive to the well-being of the general system, and to the particular welfare of individuals. He assigns our station, and it is our duty to conform to it.

I remain, Mr. Editor,
Your most obedient, humble servant,
JOSEPH JAMES,

Stoke Bishop, near Bristol,

Nov. 22, 1797.

P. S. I forgot to explain the meaning of the letter N. under most of the sentences written on the wall; the gentleman who first discovered them, in copying them off, marked each sentence with N. (the initial of his own name) to prevent copying any of them twice.

MATHEMATICAL CORRESPONDENCE.

To the Editor of the Monthly Magazine.

SIR,

PERMIT me to say a few words in reply to PHILO-COSA's remarks on my paper, respecting Imaginary Quantities.

In the first place, then, we will examine a few of Philo-Cosa's assertions, and see how far they are agreeable to truth. He has asserted, that " $\sqrt{-a}$ is a term which has no meaning;" that " $-a$ is an imaginary number;" that " $-a$ is no number at all;" and that " $\sqrt{-a}$ is nothing at all." Are these assertions generally true? I answer, they are not. If they are not generally, are they partially true? I answer, that, *independently considered*, they do not offend against the truth. The terms $-a$, and $\sqrt{-a}$, are general expressions, in which a may be made to denote any thing. Of course, then, it follows, that if a , abstractly considered, be made to signify a thing of no meaning, the expression $\sqrt{-a}$, will be "a term which has no meaning." In the same point of view, " $-a$ may denote an imaginary number." And lastly, if a is made to denote nothing, then will " $-a$ denote no number at all;" and " $\sqrt{-a}$ nothing at all;" for surely the square root of nothing is nothing; of a truth, *ex nihilo nihil fit*. But in the equations $b - a = c$ or $-a = c - b$, and $\sqrt{-a} = \sqrt{c - b}$, who is there that will say, that " $-a$ is an imaginary number," or that "it is no number at all?" and that " $\sqrt{-a}$ is a term of no meaning?" or that "it signifies nothing at all?" Here the term $-a$ is as much a real quantity or number as either b or c ; and the term $\sqrt{-a}$ has as much signification as the term

term $\sqrt{c-b}$. But, it may be asked, what signification have these last terms? I answer, that the term $\sqrt{-a}$ signifies the square root of $-a$, or in other words, the square root of a negative quantity, and is what mathematicians call an impossible or imaginary quantity (See Maclaurin's Algebra, Part I. chap. viii. sect. 49; and Part II. chap. i. sect. 8.) The other term signifies the square root of the difference of the quantities c and b .

Let us now, Mr. Editor, take a view of the progress we have made. We have discovered that Philo-Cosa's assertions are not generally true; that they are true only when the terms are *independently considered*, in which case they may be made to signify any thing at all, no matter what; and lastly, that they are all of them *false*, when applied to those terms as they occur in equations. Now, as it was professedly in this light that I considered them, *viz.* as they really occur in equations, I think it will follow of course that Philo-Cosa's assertions, and consequent reasoning on them, will fall to the ground.

After this deduction, it may seem unnecessary to take any farther notice of Philo-Cosa's objections; yet, lest any one should think that his argument against the Corollary, as he has been pleased to call it, ought to have been disproved, I will here briefly consider it. To avoid cavilling, I will grant him as far as $\sqrt{-a} \times \sqrt{-a} = \sqrt{a^2}$. "Thus," says he, "the second power of the $\sqrt{-a}$ is not $-a$, but $+a$." Against this conclusion I thus argue: $\sqrt{-a} \times \sqrt{-a} = +a$; consequently, by evolution, $\sqrt{-a} = \sqrt{+a}$, *i. e.* an imaginary or impossible quantity, equal to a real positive one, which is absurd; therefore his conclusion is false.

Having now, I presume, Mr. Editor, done away all Philo-Cosa's objections against my paper, I would beg leave to observe, that the definition is not necessary to the existence of the structure, but only tends, as I think, to make the subject more intelligible. The structure will stand without it. With each case is given, what appears to me to be the only substantial illustration of its truth of which it seems capable. And if these cases, upon every occasion in real practice, give true results, surely every useful purpose is answered.

The subject of negative and imaginary quantities is by no means a difficult one of itself. It can be considered in only two points of view: *first*, as it relates to equations; *secondly*, in the abstract, or independently. Considered in the first point of view, there can be but one opinion concerning it: it is in this light only that the subject can be at all useful; it is in this light that the illustrious Newton has considered it. Considered in the second point of view, the terms may be made to signify any thing or nothing, at the caprice of the user: it is in this light that the terms seem to admit of an indefinite number of significations, each of which may be true as here considered, but false when applied to real use.

Let us now see, Mr. Editor, if we have not discovered the funken rock on which mathematicians have foundered.

They consider the terms *independently*: in this light their conclusions are true; but when these conclusions are applied to the same terms as they occur in equations, is it any wonder that they should be false? This is the rock on which Mr. Emerson has foundered, when considering the quantities mentioned in the remark at page 117 of this Magazine. It is upon a corner of the same rock that my good friend Philo-Cosa has split.

If any of your ingenious correspondents should think it necessary to make any farther remarks on this subject, I could wish that they would consider it seriously; it surely deserves such a consideration; mathematical truths are not to be ridiculed and laughed out of countenance. After thanking you, Mr. Editor, for the indulgence you have granted me, believe me to be

Your obliged servant,

J. GARNETT.

Newcastle-upon-Tyne,
Oct. 14th, 1797.

To the Editor of the Monthly Magazine.

SIR,

I AGREE in opinion with your ingenious correspondent, Philo-Cosa, so far as he has considered the doctrine of Imaginary Quantities. But as Mr. Garnet has, in his second and third cases, drawn conclusions different from those of all other writers upon the subject * (and which have not been noticed in the reply to his paper), I here solicit indulgence to examine their rectitude.

Mr. Garnet has, in his third case, endeavoured to prove, from the equation $a - \frac{x^2}{v} = c$, that the value of the product of the imaginaries $\sqrt{-a}$, $\sqrt{-b}$ will give the result $+\sqrt{ab}$; although he has before determined (see case 1) that when these factors are supposed equal, the result

* Mr. Garnet has mistaken Professor Euler's conclusions; they are each determinately $+$, or each determinately $-$. See Professor Hutton's Dictionary, under the article "Imaginary Quantities."

would invariably be a negative quantity only ($-a$). From whence, in the conclusion of his paper, he charges Mr. Emerson with having committed a mistake, by inadvertently having considered imaginary quantities abstractedly.

It happens, however, against this assertion, that the proof brought to support it is by no means to the point. For though $\sqrt{-a}$ and $\sqrt{-b}$ are imaginary quantities, it does not thence follow that $\sqrt{-a+c}$ is also one, but the contrary, when c is supposed greater than a . Mr. Garnet ought, therefore, to prove that $\sqrt{-a} \cdot \sqrt{-b}$ will produce $\pm\sqrt{ab}$, independently of any other quantity but that (x) which was to equate their value.

Suppose then, $-\frac{x^2}{b} + a = 0$, then, by Mr. Garnet's reasoning, $x = \pm\sqrt{ab}$; by which notation I presume he means that the quantity (\sqrt{ab}) under the vinculum, is invariably $+$. For if that be denied, suppose the root extracted, and call it $\pm n$, then we have $x = \pm \pm n$, which, I think, Mr. Garnet will himself allow to be nonsense.

This being the case, let us suppose b equal to a , and then $x = \pm\sqrt{a^2} = \sqrt{-a} \cdot \sqrt{-a}$ (case 1). For the expression being generally true, must hold good in every value of \sqrt{ab} , let these factors be what they may. And this proved, we have $\sqrt{-a} \cdot \sqrt{-a} = \pm + a = x$, of certain consequence.

Hence it would seem that Mr. Garnet has fallen into an error, from the directly opposite cause he has supposed Mr. Emerson's to spring from, *viz.* reasoning from equation. For, supposing $-\frac{x^2}{b} + a = 0$, it is certain that whatever x is, it will, from the nature of affected equations, have two equal values $+\sqrt{ab}$, and $-\sqrt{ab}$, differing only in the signs. Wherefore any conclusion drawn from such premises, proves neither for nor against his argument, the double sign being an effect, the result of a cause wholly independent of that which arises from the multiplication of the imaginary quantities.

Reassuming, then, the equation $\sqrt{-a} \cdot \sqrt{-a} = \pm + a = x$. Since, as we have just now proved that the double sign affixed to a has nothing to do with its value, as applied to its being the product of $\sqrt{-a} \cdot \sqrt{-a}$, it follows then that their value is $+a$.

Indeed, the attempt to prove the general properties of imaginary quantities, by any conclusions drawn from particular equations, appears (to me) equally impracticable and absurd. For instance, allowing $\sqrt{-a} \cdot \sqrt{-a} = -a$. Then since we know that $-\sqrt{a} \cdot +\sqrt{a}$ is also equal to $-a$, we have, from the nature of geometrical progression, $-\sqrt{a} : \sqrt{-a} :: \sqrt{-a} : +\sqrt{a}$. Now, it has been proved that each of the equal means must be greater than one extreme, suppose than $-\sqrt{a}$. Then, multiplying those unequal quantities by $-\sqrt{a}$, we have a less than $-\sqrt{-a^2}$, which is impossible, since the last expression cannot produce a value greater than a .

Newcastle-upon-Tyne,
Oct. 17, 1797.

I am, sir, your most humble servant,

For the Monthly Magazine.

A NEW DEMONSTRATION OF THE RULE FOR FINDING THE SUM OF THE POWERS OF THE ROOTS OF ANY EQUATION.

[Concluded from No. XXIII.]

IV. BUT from De Moivre's theorem for raising an infinite multinomial to any given power, it is manifest that a general expression for the sums of the m^{th} powers of $\alpha, \beta, \gamma, \delta, \epsilon$, &c. may be easily deduced; for if A be the first term of P^m , B the second term of P^{m-1} , C the third term of P^{m-2} , D the fourth term of P^{m-3} , &c. A, B, C, D , &c. may be found by that theorem, and thence, by Sect. III, $\alpha^m + \beta^m + \gamma^m + \delta^m + \epsilon^m + \dots = A + \frac{m}{m-1} \times B + \frac{m}{m-2} \times$

$$C + \frac{m}{m-3} \times D + \frac{m}{m-4} \times E + \frac{m}{m-5} \times F + \dots$$

$$\text{Now } P^m = p^m - mqp^{m-1} + \frac{m(m-1)}{2} q^2 p^{m-2} - \frac{m(m-1)(m-2)}{6} q^3 p^{m-3} + \dots$$

$$+ \frac{m(m-1)}{2} q^2 p^{m-2} \left. \vphantom{\frac{m(m-1)}{2} q^2 p^{m-2}} \right\} x^2$$

$$- \frac{m(m-1)(m-2)}{6} q^3 p^{m-3} \left. \vphantom{\frac{m(m-1)(m-2)}{6} q^3 p^{m-3}} \right\} x^3$$

$$- \frac{m(m-1)}{2} 2qrp^{m-2} \left. \vphantom{\frac{m(m-1)}{2} 2qrp^{m-2}} \right\} x^3$$

$$- ms^2 p^{m-1}$$

4m

$$\left. \begin{aligned}
 &+ m \cdot \frac{m-1}{2} \cdot \frac{m-2}{3} \cdot \frac{m-3}{4} q^4 p^{m-4} \\
 &+ m \cdot \frac{m-1}{2} \cdot \frac{m-2}{3} \cdot 3q^2 r p^{m-3} \\
 &+ m \cdot \frac{m-1}{2} \cdot (2qs + r^2) p^{m-2} \\
 &+ m r p^{m-1} \\
 &\&c.
 \end{aligned} \right\} 24$$

Hence, by substituting m , $m-1$, $m-2$, $m-3$, &c. instead of m , the following values are derived:

$$A = p^m$$

$$B = -(m-1) q p^{m-1}$$

$$C = (m-2) r p^{m-2} + (m-2) \cdot \frac{(m-3)}{2} \cdot q^2 p^{m-4}$$

$$D = -(m-3) \cdot \frac{(m-4)}{2} \cdot \frac{(m-5)}{3} \cdot q^3 p^{m-6} - (m-3) \cdot \frac{(m-4)}{2} \cdot 2q r p^{m-5} - (m-3) s p^{m-4}$$

$$\begin{aligned}
 E = &(m-4) \cdot \frac{(m-5)}{2} \cdot \frac{(m-6)}{3} \cdot \frac{(m-7)}{4} \cdot q^4 p^{m-8} + (m-4) \cdot \frac{(m-5)}{2} \cdot \frac{(m-6)}{3} \cdot 3q^2 r p^{m-7} \\
 &+ (m-4) \cdot \frac{(m-5)}{2} \cdot (2qs + r^2) p^{m-6} + (m-4) t p^{m-5}
 \end{aligned}$$

&c.

$$\begin{aligned}
 \text{And therefore } \alpha^m + \beta^m + \gamma^m + \delta^m + \epsilon^m + \&c. = &p^m - m q p^{m-1} + m r p^{m-2} - m s p^{m-3} \\
 &+ m \cdot \frac{m-3}{2} \cdot q^2 p^{m-4}
 \end{aligned}$$

$$\begin{aligned}
 &+ m t p^{m-5} & - m v p^{m-6} & + m w p^{m-7} \\
 &- m(m-4) q r p^{m-5} & + m(m-5) q s p^{m-6} & - m(m-6) q t p^{m-7} \\
 & & - m \cdot \frac{m-4}{2} \cdot \frac{m-5}{3} \cdot q^3 p^{m-6} & + m(m-5) \cdot \frac{(m-6)}{2} \cdot q^2 r p^{m-7} \\
 & & + m \cdot \frac{m-5}{2} \cdot r^2 p^{m-6} & - m(m-6) r s p^{m-7} \\
 & & \&c.
 \end{aligned}$$

V. This is exactly the rule given by Waring in his *Miscellanea Analytica*, which appears to be the most proper form in which the sum can be expressed: and from this the Newtonian formulæ may be deduced.

Example I.

Let the given equation be $x^2 - 8x + 12 = 0$. In this example $p = 8$, and $q = 12$.

Wherefore $\alpha + \beta = p = 8$

$$\alpha^2 + \beta^2 = p^2 - 2q = 64 - 24 = 40$$

$$\alpha^3 + \beta^3 = p^3 - 3qp = 512 - 288 = 224$$

$$\alpha^4 + \beta^4 = p^4 - 4qp^2 + 2q^2 = 4096 - 3072 + 288 = 1312$$

&c.

which values are evidently accurate, for α being $= 6$, and $\beta = 2$,

$$\alpha + \beta \text{ is } = 6 + 2 = 8$$

$$\alpha^2 + \beta^2 = 36 + 4 = 40$$

$$\alpha^3 + \beta^3 = 216 + 8 = 224$$

$$\alpha^4 + \beta^4 = 1296 + 16 = 1312$$

&c.

Example II.

Let the equation be $x^4 - 12x^3 + 49x^2 - 78x + 40 = 0$: that is $p = 12$, $q = 49$, $r = 78$, $s = 40$, $t = 0$, $v = 0$, $w = 0$, &c.

Then $\alpha + \beta + \gamma + \delta = p = 12$

$$\alpha^2 + \beta^2 + \gamma^2 + \delta^2 = p^2 - 2q = 144 - 98 = 46$$

$$\alpha^3 + \beta^3 + \gamma^3 + \delta^3 = p^3 - 3qp = 1728 - 1764 + 234 = 198$$

$$\alpha^4 + \beta^4 + \gamma^4 + \delta^4 = p^4 - 4qp^2 + 4r^2 - 2s = 898$$

&c.

which may be easily proved, as $\alpha, \beta, \gamma, \delta$, are equal to 5, 4, 2, 1, respectively.

Example III.

Required, the sum of the 6th powers of the roots of the equation,

$$x^5 - 15x^4 + 85x^3 - 225x^2 + 274x - 120 = 0.$$

By the general theorem $\alpha^6 + \beta^6 + \gamma^6 + \delta^6 + \epsilon^6 = p^6 - 6qp^4 + 6rp^3 - (6s - 9q^2) p^2 + (6t - 12qr) p + (6r^2 - 2q^3 + 3s^2)$.

But in this example $p = 15$, $q = 85$, $r = 225$, $s = 274$, and $t = 120$.

Therefore $p^6 = 11390625$, $6rp^3 = 4556250$, $(9q^2 - 6s) p^2 = 14260725$, $6qt^2 = 25318750$,

Therefore $p^6 = 11390625$, $6rp^3 = 4556250$, $(9q^2 - 6s) p^2 = 14260725$, $6qt^2 = 25318750$, $(12qr - 6t) p = 3431700$, $(2q^3 - 3r^2 - 6qs) = 936635$.

$$(12qr - 6t) p = 3431700, (2q^3 - 3r^2 - 6qs) = 936635.$$

4 D 2

And

And $\alpha^6 + \beta^6 + \gamma^6 + \delta^6 + \epsilon^6 = 11390625 - 25818750 + 4556250 + 14260725 - 3431700 - 936635 = 30207600 - 30187085 = 20515$

The sum required then is $= 20515$, which may be easily shown to be accurate in this case, as the roots of the equation are 1, 2, 3, 4, 5, and consequently

$$\alpha^6 + \beta^6 + \gamma^6 + \delta^6 + \epsilon^6 = 15625 + 4096 + 729 + 64 + 1 = 20515 \text{ as per theorem.}$$

VI. The uses to which this rule may be applied are many and various. It suggests, in the first place an easy and expeditious method for finding the limits between which the roots of an equation are contained when none of them is impossible. For in this case the squares, the biquadrates, the cubo-cubes, &c. of all the roots will be affirmative, and therefore greater than the same power of the greatest root. Hence, in order to determine a number greater than any of the roots of an equation, find by the theorem the sum of the squares, biquadrates, &c. of the roots, and extract the same root of this sum. The result will be the number required. Thus, in the first

example, $\alpha^2 + \beta^2 = 40$, $\alpha^4 + \beta^4 = 1312$, &c. and consequently $\sqrt{\alpha^2 + \beta^2} = \sqrt{40} = 6\frac{1}{3}$

nearly, $\sqrt[4]{\alpha^4 + \beta^4} = \sqrt[4]{1312} = 6\frac{1}{100}$ nearly, &c. which shows that the greatest root must

be less than $6\frac{1}{3}$, $6\frac{1}{100}$, &c. Also, in the third example, as $\alpha^6 + \beta^6 + \gamma^6 + \delta^6 + \epsilon^6 = 20515$,

$\sqrt[6]{20515}$, or $5\frac{1}{4}$ nearly, is greater than any of the roots of the equation.

In this way, it is evident, we may often find a near value of the greatest root, and afterwards by the common methods of approximation determine it to any degree of exactness. If one of the roots be much greater than the others, this method may be employed with much success: as for example in the equation $x^2 - 101x + 100 = 0$, where $p = 101$, $q = 100$, and $\alpha^2 + \beta^2 = p^2 - 2q = 10201 - 200 = 10001$, the square root of the sum of the squares is nearly equal to $100\frac{1}{200}$, which differs from the greatest root of the equation only by $\frac{1}{20000}$ th part of the whole.

VII. A second use to which this rule may be applied, is to investigate general properties of curve lines. Harriot, by pointing out the genesis of equations from the combination of inferior ones and thence the formation of the coefficients, suggested a great number of such properties; from the preceding theorem, which is founded upon this genesis, it is manifest, that many more may be deduced. We might exemplify this by demonstrating some of those curious properties of the circle given by that excellent geometer Dr. Matthew Stewart, in his book of General Theorems, but this we shall leave to some other occasion.

VIII. The last application which we shall make of this theorem is to the analysis of a certain class of problems belonging to the higher geometry. When it is required to determine the equation of a curve, from having given a certain relation between the segments of a variable line, which meets the curve in two or more points, the investigation will be much shortened by a knowledge of such theorems as the above. The cases in which it will be useful are those where the sum of any powers of the segments are given. The following problem may be given as an example:

“Let the fixed point A be the pole of an indefinite number of right-lines, as ABB', it is required to determine the curve line BB' which all these lines cut in the points B, B', &c. so that the sum of the m^{th} powers of PB, PB', &c. may be given.”

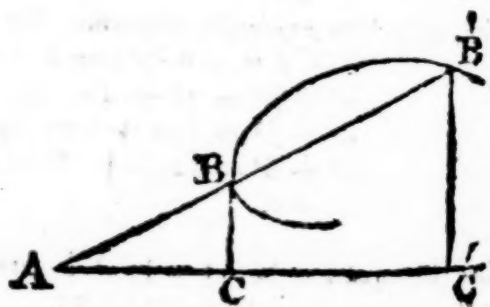
Let AC be taken for the axis, and from B, B', &c. draw the perpendiculars BC, B'C', &c.: then if n be the number of points in which AB cuts the curve, the number of lines AB, AB', &c. will be likewise $= n$, and consequently by a well-known property of curve-lines the relation between AB and the angle BAC will be expressed by an equation of the n^{th} degree.

Let AB therefore $= x$, and let p, q, r, \dots &c. be certain functions of the sine, cosine, tangent, &c. of the angle BAC; then may the relation between x and this angle be expressed by the equation $x^n - px^{n-1} + qx^{n-2} - rx^{n-3} + \dots = 0$, by which assumption the first condition of the problem is answered.

IX. The roots of this equation, it is evident, are equal to the segments AB, AB', &c. and the second condition requires that the sum of the m^{th} powers of these roots shall be constant: let this sum $= A$, and by means of the theorem Sect. IV, the relation between p, q, r, \dots will be given. We have then $x^n - px^{n-1} + qx^{n-2} - rx^{n-3} + \dots = 0$, and $p^m - mq^{m-1} + mr^{m-2} + \dots$

$$\left. \begin{aligned} &+ m \cdot \frac{m-3}{2} q^2 p^{m-4} \&c. \\ &\&c. \end{aligned} \right\} = A$$

which two equations answer all the conditions of the problem.



Had the sum of more powers of the roots of this equation been given, the values of $p, q, r, &c.$ would have been more restricted.

From this equation, the relation between AC and BC may be easily deduced; for if $AC = x$, and $BC = y$, x^2 will be $= z^2 + y^2$, $x = \sqrt{(z^2 + y^2)}$, and $\frac{y}{x}$ = the tangent of the angle BAC, which values being substituted in the foregoing equations, the relation required will be found. We shall now consider some particular cases of this problem.

X. Let the number of points B, B', &c. be two, and let the sum of the squares of AB, AB' be given; then will $n = 2$, $m = 2$, and the two equations $x^2 - px + q = 0$, and $p^2 - 2q = A$. Hence $2q = p^2 - A$, $q = \frac{1}{2} p^2 - \frac{1}{2} A$; and $x^2 - px + \frac{1}{2} p^2 - \frac{1}{2} A = 0$.

Let $n = 2$ and $m = 3$; then will $x^2 - px + q = 0$, and $p^3 - 3q^{\frac{1}{2}} = A$. Hence $q = \frac{p^3 - A}{3}$, and $x^2 - px + \frac{1}{3} p^3 - \frac{A}{3} = 0$.

Let $n = 2$, or let the line AB cut the curve in two points; then will $x^2 - px + q = 0$, and $p^m - mqp^{m-2} + m \cdot \frac{m-3}{2} q^2 p^{m-4} - m \cdot \frac{m-5}{2} q^3 p^{m-6} + \&c. = A$. In this case the latter equation may be expressed differently; for the two values of x being equal to $\frac{1}{2} p \pm \sqrt{(\frac{1}{4} p^2 - q)}$ and $\frac{1}{2} p - \sqrt{(\frac{1}{4} p^2 - q)}$, AB^m will be $= (\frac{1}{2} p + \sqrt{(\frac{1}{4} p^2 - q)})^m$, $AB'^m = (\frac{1}{2} p - \sqrt{(\frac{1}{4} p^2 - q)})^m$, and $(\frac{1}{2} p + \sqrt{(\frac{1}{4} p^2 - q)})^m + (\frac{1}{2} p - \sqrt{(\frac{1}{4} p^2 - q)})^m = A$.

But a much simpler solution of this case may be given by assuming an equation of the form $x^{2m} - px^m + q = 0$ instead of $x^2 - px + q = 0$; for then $AB^m + AB'^m = p$, and consequently $x^{2m} - Ax + q = 0$, which equation, expressing the nature of the curve, is infinitely more general than those of Bernoulli, Leibnitz, and de l'Hospital.

Aberdeen, Aug. 1796.

β. CYGNI.

APPENDIX.

XI. In Sect. VI. a method is pointed out by which the greatest root of any equation may be found by repeated approximations, when none of the roots are impossible. This is done by finding the sum of any power of the roots of the equation by the general rule, and extracting the same root of the sum; that is, if $\alpha, \beta, \gamma, \delta, &c.$ be equal to the roots of the given equation, α being the greatest, and $m =$ any number sufficiently large, α will be nearly equal to $\sqrt[m]{\alpha^m + \beta^m + \gamma^m + \delta^m + \&c.}$. Now it is manifest that, if m be supposed infinitely great, α will be exactly equal to the preceding expression, and consequently if its value can be determined in this case, we will have a general rule for finding α .

XII. But by Sect. IV, the value of $\alpha^m + \beta^m + \gamma^m + \delta^m, &c.$ is equal to $p^m - mqp^{m-2} + mr^2 p^{m-4} - (ms - m \cdot \frac{m-3}{2} \cdot q^2) p^{m-4} + \&c.$; whence, by means of De Moivre's theorem, the m^{th} root of this expression is found $= p - \frac{q}{p} + \frac{r}{p^2} - \frac{s+q^2}{p^3} + \frac{t+3qr}{p^4} - \frac{v+4qs+2r^2+2q^3}{p^5} + \&c.$

Therefore $\alpha = p - \frac{q}{p} + \frac{r}{p^2} - \frac{s+q^2}{p^3} + \frac{t+3qr}{p^4} - \frac{v+4qs+2r^2+2q^3}{p^5} + \&c.$ which will give the true value of α , if the number of terms of this series be infinite, which is the case when m is infinitely great.

By dividing this series into factors, we have $\alpha = (p - \frac{q}{p}) (1 + \frac{r}{p^2}) (1 - \frac{s+q^2}{p^3}) (1 + \frac{t+3qr}{p^4}) (1 - \frac{v+3q^3+2r^2+5q^5}{p^6}) \&c.$

Now it is evident, that if the values of $q, r, s, t, &c.$ be small in comparison of p , the series expressing the value of α will converge very quickly: in such cases, therefore, it may be used with advantage.

In this value, if q, r, s, t , be taken $= 0$, α is equal to p exactly, which, it is manifest, must be true, as the given equation is then a simple one. Also, by making q , or r , or s , or t , &c. to vanish with all the following coefficients, we shall obtain the following particular theorems:

1. In quadratic equations $\alpha = p - \frac{q}{p} - \frac{q^2}{p^3} - \frac{2q^3}{p^5} - \&c.$

2. In cubic equations $\alpha = p - \frac{q}{p} + \frac{r}{p^2} - \frac{q^2}{p^3} + \frac{3qr}{p^4} - \frac{2r^2+2q^3}{p^5} + \&c.$

3. In biquadratic equations $\alpha = p - \frac{q}{p} + \frac{r}{p^2} - \frac{s+q^2}{p^3} + \frac{3qr}{p^4} - \frac{4qs+2r^2+2q^3}{p^5} \&c.$

And $\alpha^6 + \beta^6 + \gamma^6 + \delta^6 + \epsilon^6 = 11390625 - 25818750 + 4556250 + 14260725 - 3431700 - 936635 = 30207600 - 30187085 = 20515$

The sum required then is $= 20515$, which may be easily shown to be accurate in this case, as the roots of the equation are 1, 2, 3, 4, 5, and consequently

$$\alpha^6 + \beta^6 + \gamma^6 + \delta^6 + \epsilon^6 = 15625 + 4096 + 729 + 64 + 1 = 20515 \text{ as per theorem.}$$

VI. The uses to which this rule may be applied are many and various. It suggests, in the first place an easy and expeditious method for finding the limits between which the roots of an equation are contained when none of them is impossible. For in this case the squares, the biquadrates, the cubo-cubes, &c. of all the roots will be affirmative, and therefore greater than the same power of the greatest root. Hence, in order to determine a number greater than any of the roots of an equation, find by the theorem the sum of the squares, biquadrates, &c. of the roots, and extract the same root of this sum. The result will be the number required. Thus, in the first

example, $\alpha^2 + \beta^2 = 40$, $\alpha^4 + \beta^4 = 1312$, &c. and consequently $\sqrt{\alpha^2 + \beta^2} = \sqrt{40} = 6\frac{1}{3}$

nearly, $\sqrt[4]{\alpha^4 + \beta^4} = \sqrt[4]{1312} = 6\frac{1}{100}$ nearly, &c. which shows that the greatest root must

be less than $6\frac{1}{3}$, $6\frac{1}{100}$, &c. Also, in the third example, as $\alpha^6 + \beta^6 + \gamma^6 + \delta^6 + \epsilon^6 = 20515$,

$\sqrt[6]{20515}$, or $5\frac{1}{4}$ nearly, is greater than any of the roots of the equation.

In this way, it is evident, we may often find a near value of the greatest root, and afterwards by the common methods of approximation determine it to any degree of exactness. If one of the roots be much greater than the others, this method may be employed with much success: as for example in the equation $x^2 - 101x + 100 = 0$, where $p = 101$, $q = 100$, and $\alpha^2 + \beta^2 = p^2 - 2q = 10201 - 200 = 10001$, the square root of the sum of the squares is nearly equal to $100\frac{1}{200}$, which differs from the greatest root of the equation only by $\frac{1}{20000}$ th part of the whole.

VII. A second use to which this rule may be applied, is to investigate general properties of curve lines. Harriot, by pointing out the genesis of equations from the combination of inferior ones and thence the formation of the coefficients, suggested a great number of such properties; from the preceding theorem, which is founded upon this genesis, it is manifest, that many more may be deduced. We might exemplify this by demonstrating some of those curious properties of the circle given by that excellent geometer Dr. Matthew Stewart, in his book of General Theorems, but this we shall leave to some other occasion.

VIII. The last application which we shall make of this theorem is to the analysis of a certain class of problems belonging to the higher geometry. When it is required to determine the equation of a curve, from having given a certain relation between the segments of a variable line, which meets the curve in two or more points, the investigation will be much shortened by a knowledge of such theorems as the above. The cases in which it will be useful are those where the sum of any powers of the segments are given. The following problem may be given as an example:

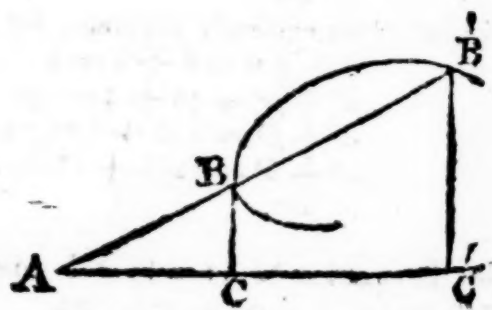
“Let the fixed point A be the pole of an indefinite number of right-lines, as ABB', it is required to determine the curve line BB' which all these lines cut in the points B, B', &c. so that the sum of the m^{th} powers of PB, PB', &c. may be given.”

Let AC be taken for the axis, and from B, B', &c. draw the perpendiculars BC, B'C', &c.: then if n be the number of points in which AB cuts the curve, the number of lines AB, AB', &c. will be likewise $= n$, and consequently by a well-known property of curve-lines the relation between AB and the angle BAC will be expressed by an equation of the n^{th} degree. Let AB therefore $= x$, and let p, q, r, \dots be certain functions of the sine, cosine, tangent, &c. of the angle BAC; then may the relation between x and this angle be expressed by the equation $x^n - px^{n-1} + qx^{n-2} - rx^{n-3} + \dots = 0$, by which assumption the first condition of the problem is answered.

IX. The roots of this equation, it is evident, are equal to the segments AB, AB', &c. and the second condition requires that the sum of the m^{th} powers of these roots shall be constant: let this sum $= A$, and by means of the theorem Sect. IV. the relation between p, q, r, \dots will be given. We have then $x^n - px^{n-1} + qx^{n-2} - rx^{n-3} + \dots = 0$, and $p^m - mq^{m-1} + mr^{m-2} - \dots$

$$\left. \begin{aligned} &+ m \cdot \frac{m-3}{2} q^2 p^{m-4} \&c. \\ &\&c. \end{aligned} \right\} = A$$

which two equations answer all the conditions of the problem.



Had the sum of more powers of the roots of this equation been given, the values of $p, q, r, &c.$ would have been more restricted.

From this equation, the relation between AC and BC may be easily deduced; for if $AC = x$, and $BC = y$, x^2 will be $= z^2 + y^2$, $x = \sqrt{z^2 + y^2}$, and $\frac{y}{x}$ the tangent of the angle BAC, which values being substituted in the foregoing equations, the relation required will be found. We shall now consider some particular cases of this problem.

X. Let the number of points B, B', &c. be two, and let the sum of the squares of AB, AB' be given; then will $n = 2$, $m = 2$, and the two equations $x^2 - px + q = 0$, and $p^2 - 2q = A$. Hence $2q = p^2 - A$, $q = \frac{1}{2} p^2 - \frac{1}{2} A$; and $x^2 - px + \frac{1}{2} p^2 - \frac{1}{2} A = 0$.

Let $n = 2$ and $m = 3$; then will $x^3 - px + q = 0$, and $p^3 - 3qh = A$. Hence $q = \frac{p^3 - A}{3}$, and $x^3 - px + \frac{1}{3} p^3 - \frac{A}{3} = 0$.

Let $n = 2$, or let the line AB cut the curve in two points; then will $x^2 - px + q = 0$, and $p^m - mqp^{m-2} + m \cdot \frac{m-3}{2} q^2 p^{m-4} - m \cdot \frac{m-4}{2} \cdot \frac{m-5}{3} q^3 p^{m-6} + &c. = A$. In this case the latter equation may be expressed differently; for the two values of x being equal to $\frac{1}{2}p \pm \sqrt{(\frac{1}{4}p^2 - q)}$ and $\frac{1}{2}p - \sqrt{(\frac{1}{4}p^2 - q)}$, AB^m will be $= (\frac{1}{2}p + \sqrt{(\frac{1}{4}p^2 - q)})^m$, $AB'^m = (\frac{1}{2}p - \sqrt{(\frac{1}{4}p^2 - q)})^m$, and $(\frac{1}{2}p + \sqrt{(\frac{1}{4}p^2 - q)})^m + (\frac{1}{2}p - \sqrt{(\frac{1}{4}p^2 - q)})^m = A$.

But a much simpler solution of this case may be given by assuming an equation of the form $x^{2m} - px^m + q = 0$ instead of $x^2 - px + q = 0$; for then $AB^m + AB'^m = p$, and consequently $x^{2m} - Ax + q = 0$, which equation, expressing the nature of the curve, is infinitely more general than those of Bernoulli, Leibnitz, and de l'Hospital.

Aberdeen, Aug. 1796.

B. CYGNI.

APPENDIX.

XI. In Sect. VI. a method is pointed out by which the greatest root of any equation may be found by repeated approximations, when none of the roots are impossible. This is done by finding the sum of any power of the roots of the equation by the general rule, and extracting the same root of the sum; that is, if $\alpha, \beta, \gamma, \delta, &c.$ be equal to the roots of the given equation, α being the greatest, and $m =$ any number sufficiently large, α will be nearly equal to $\sqrt[m]{\alpha^m + \beta^m + \gamma^m + \delta^m, &c.}$. Now it is manifest that, if m be supposed infinitely great, α will be exactly equal to the preceding expression, and consequently if its value can be determined in this case, we will have a general rule for finding α .

XII. But by Sect. IV, the value of $\alpha^m + \beta^m + \gamma^m + \delta^m, &c.$ is equal to $p^m - mqp^{m-2} + mr^2p^{m-4} - (ms - m \cdot \frac{m-3}{2} \cdot q^2)p^{m-4} + &c.$; whence, by means of De Moivre's theorem, the m^{th} root of this expression is found $= p - \frac{q}{p} + \frac{r}{p^2} - \frac{s+q^2}{p^3} + \frac{t+3qr}{p^4} - &c.$

Therefore $\alpha = p - \frac{q}{p} + \frac{r}{p^2} - \frac{s+q^2}{p^3} + \frac{t+3qr}{p^4} - \frac{v+4q^3+2r^2+2q^2}{p^5} + &c.$ which will give the true value of α , if the number of terms of this series be infinite, which is the case when m is infinitely great.

By dividing this series into factors, we have $\alpha = (p - \frac{q}{p}) (1 + \frac{r}{p^2}) (1 - \frac{s+q^2}{p^3}) (1 + \frac{t+4qr}{p^4}) (1 - \frac{v+3q^3+2r^2+5q^2}{p^5}) &c.$

Now it is evident, that if the values of $q, r, s, t, &c.$ be small in comparison of p , the series expressing the value of α will converge very quickly: in such cases, therefore, it may be used with advantage.

In this value, if q, r, s, t , be taken $= 0$, α is equal to p exactly, which, it is manifest, must be true, as the given equation is then a simple one. Also, by making q , or r , or s , or t , &c. to vanish with all the following coefficients, we shall obtain the following particular theorems:

1. In quadratic equations $\alpha = p - \frac{q}{p} - \frac{q^2}{p^3} - \frac{2q^3}{p^5} - &c.$

2. In cubic equations $\alpha = p - \frac{q}{p} + \frac{r}{p^2} - \frac{q^2}{p^3} + \frac{3qr}{p^4} - \frac{2r^2+2q^3}{p^5} + &c.$

3. In biquadratic equations $\alpha = p - \frac{q}{p} + \frac{r}{p^2} - \frac{s+q^2}{p^3} + \frac{3qr}{p^4} - \frac{4q^3+2r^2+2q^2}{p^5} &c.$

4. In equations of 5 dimensions $\alpha = p - \frac{q}{p} + \frac{r}{p^2} - \frac{s+q^2}{p^3} + \frac{t+3qr}{p^4} - \frac{v+4r^2+2s^2+2q^3}{p^5}$ &c.

XIII. *Example 1.* Let the equation $x^5 - 124x + 19 = 0$, be given, where $p = 124$ and $q = 19$. Here q being small in comparison of p , the greatest root will be easily determined by the preceding series:

Therefore $\alpha = 124 - \frac{19}{124} - \frac{19^2}{124^3} - \frac{2 \cdot 19^3}{124^5} - \text{&c.}$; or if A represent the second term,

B the third, &c. $\alpha = 124 - \frac{19}{124} - \frac{19^2}{124^3} \cdot A - \frac{2 \cdot 19^3}{124^5} \cdot B, \text{ &c.}$

$$\text{Now } \frac{19}{124} = 0.1532255$$

$$+ \frac{19^2}{124^3} \cdot A = 0.0001894$$

$$+ \frac{19^3}{124^5} \cdot B = 0.0000006$$

&c.

$$\text{Sum} = 0.1534155$$

$$124.000000$$

Diff.

$123.8465845 = \alpha$, the greatest root of the equation, true to the last figure;

The calculation might have been differently performed, thus: By Simpson's Mathematical

Dissertations, the value of $\alpha m + \beta m^3, \text{ &c.}$ is nearly equal to $\frac{\alpha^2 m}{\alpha - \beta m^2}$, wherefore $\frac{q}{p} + \frac{q^2}{p^3} + \frac{2q^3}{p^5} +$

&c. is nearly $= \frac{q^2 p}{q p^2 - q^2} = \frac{q p}{p^2 - q}$, and $\alpha = p \times \frac{p^2 - 2q}{p^2 - q}$ nearly. In the given example $\alpha = 124$

$\times \frac{15338}{15357} = 123.8465846$ nearly, the same as before.

XIV. *Example 2.* Required, the greatest root of the equation $x^3 - 100x^2 + 273x - 194 = 0$.

Here $p = 100, q = 273$, and $r = 194$; wherefore, α is equal to $100 - \frac{273}{100} + \frac{194}{100^2} + \frac{273^2}{100^3}$

+ &c. $= 100 - 3 = 97$; and thence the other two roots are found to be 1 and 2.

In those cases where $q, r, s, t, \text{ &c.}$ are very small in comparison of p , α will be nearly equal to $\frac{q(p^2 - r) + r^2}{q p + r}$; in other cases, when the series converges very slowly, the methods pointed out

by Mr. Stirling * may be employed with success. From the general series, too, a number of others, of swifter convergency might be easily deduced; but this is perhaps unnecessary, as there are many other methods for finding the roots of equations equally general and requiring much less labour in their application. The following theorem, however, for quadratic equations, as being in many cases very accurate and useful:

Let $R = r - q p^2 \times \frac{p^2 - 2q}{(p^2 - q)^2}$, and $\rho = p \times \frac{p^2 - 2q}{p^2 - q}$,

then will $\alpha = \frac{\rho(p - 2\rho)^2 + \pi(p - \rho)}{(\pi - 2\rho)^2 + \pi}$.

Aberdeen, Aug. 1796.

B. CYGNET.

ANSWERS TO THE QUESTIONS THAT HAVE BEEN PROPOSED.

QUESTION XXXII.—Answered by Mr. James Ashton, of Harrington.

LET AB represent the height of the wall, AG the spout, R the place of the reservoir, and GR a portion of a parabola which the water describes in its fall, the vortex of which is the point V . Let GFE be perpendicular to AB ; in DC take $VC = \text{one-fourth of the parameter}$, and let CA be joined. Put $AB = 30, BR = 10, AG = 2\frac{1}{2}, FG = x$, and $FA = y$; then, by the laws of the descent of falling bodies, the velocity with which the water leaves the spout at G , is the same as might be acquired by a perpendicular descent through AF ; moreover, a projectile moving in a parabola VGR , hath a velocity G equal to what may be acquired by a perpendicular descent through CE ; whence $AF = CE$, and CA is parallel to DR .



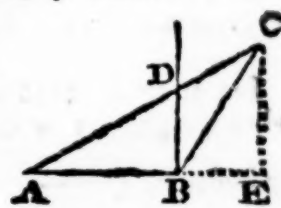
* Methodus Differentialis sive Tractatus de Summatione & Interpolatione Serierum Infinitarum. Now

Now the absolute velocity at G is as \sqrt{AF} , and that in the direction of GH as \sqrt{VE} , and this proportion will be expressed by that of AG to AF; whence we have $\sqrt{y} : \sqrt{VE} :: c : y$, or $y : VE :: c^2 : y^2$, then $VE = \frac{y^3}{c^2}$, and $CV = y - \frac{y^3}{b^2} = \frac{c^2y - y^3}{c^3}$; but $y^2 = c^2 - x^2$, therefore, $CV = \frac{x^2y}{c^2} = \frac{1}{4}$ the parameter; and, by a common property, $EG = \sqrt{VE \times 4CV} = \sqrt{\frac{4x^2y^4}{c^4}} = \frac{2xy^2}{c^2}$; but $HR = b - x$, then $\frac{2xy^2}{c^2} + b - x = \frac{2xy^2 + bc^2 - c^2x}{c^2} = DR$, then, by conics, we shall have $4CV : DR + EG :: HR : BF$, that is, $\frac{4x^2y}{c^2} : \frac{4xy^2 - c^2x + bc^2}{c^2} :: b - x : a - y$, therefore, $4bxy^2 - 2bc^2x + c^2x^2 + b^2c^2 = 4ax^2y$; but $y^2 = c^2 - x^2$, and $y = \sqrt{c^2 - x^2}$, then, by substitution, $x^2 - mx^3 + 2bx + b^2 = \mu x^2 \sqrt{c^2 - x^2}$ (where $m = 6.4$, and $\mu = 19.2$). And this squared and resolved, gives $x = 1.7376$ feet, then $y = 1.802$, and $x - c = 69504$, the natural sine of the required; $= 44^\circ 2'$ nearly.

This question was also answered by Mr. John Collins, Mr. T. Hickman, and Virgo.

QUESTION XXXIII (No. XX).—Answered by Mr. R. Simpson, of Bath.

MAKE AB equal to the given base, also BD perpendicular to it, so that AB be to BD in the given ratio. Join AD, which produce indefinitely, and make the angle DBC equal to the angle A; so shall ABC be the triangle sought.



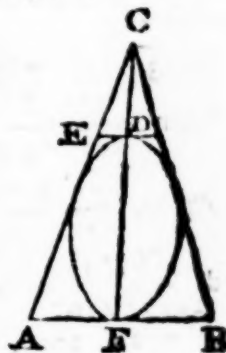
For, draw CE parallel to DB; then the angle $BCE = DBC = DAB$ by the construction; therefore their complements are also equal; that is, the complement of the angle A is equal the supplement of the angle B. Also, the triangles AEC, ABD, BCE, are equiangular; and therefore $AC : BC :: AE : CE :: AB : BD$, that is, in the given ratio by construction.

This Question was also answered by Mr. James Afton, Mr. D. Booth, Mr. J. Collins, Mr. J. H. Mr. T. Hickman, and Virgo.

QUESTION XXXIV (No. XXI).—Answered by the Rev. L. Evans, of Ffoxfield, Wilts.

HAVING given the ratio of the base to one of the sides of an isosceles triangle as 1 to r , and the area of its greatest inscribed ellipsis $= a$, the dimensions of both will be found thus:

Suppose, first, the annexed figure to represent a triangle and ellipsis similar to those required; in which $AB = 1$, $AC = BC = r$, and consequently $CF = \sqrt{r^2 - \frac{1}{4}}$, are given quantities. Put $AF = b$, $CF = p$, and $DF = x$. Then, by similar triangles, $CF : AF :: CD : DE = b \times \frac{p-x}{p}$; and by the property of the ellipsis $2\sqrt{AF \times DE} = 2b\sqrt{\frac{p-x}{p}}$ the conjugate diameter



of the ellipsis; also, by mensuration, $.7854 \times 2bx\sqrt{\frac{p-x}{p}} =$ its area, or maximum; or $\mu x^2 - x^3 = a$ maximum; the fluxion of which made $= 0$, gives $x = \frac{2}{3}p$, or the vertical axis $\frac{2}{3}$ of the triangle's perpendicular.

Next, let the above figure now represent the real triangle and ellipsis in question, the area of the latter being $= a$; also, let $z = AB$, the base; then $z\sqrt{r^2 - \frac{1}{4}} = CF$ the perpendicular, and

$\frac{2}{3}z\sqrt{r^2 - \frac{1}{4}} = DF$ the vertical axis; also, by similar triangles, $CF : AF :: CD : DE = \frac{1}{6}z$, and $2\sqrt{AF \times DE} = z\sqrt{\frac{1}{3}}$, the horizontal axis; consequently $.7854 \times z\sqrt{\frac{1}{3}} \times \frac{2}{3}z\sqrt{r^2 - \frac{1}{4}} = a$, and hence $z = \sqrt[4]{\frac{27^2}{4r^2 - 1}}$, where n is $= .7854$. Hence the remaining dimensions will follow.

This Question was also answered by Mr. James Afton, Mr. John Collins, and Mr. T. Hickman.

QUESTION

QUESTION XXXV (No XXI).—Answered by Mr. James Ashton, of Harrington.

THE surface of the given sphere is $2827 \cdot 44$, and its solidity is $14137 \cdot 2$; and by the given densities, the weight of the same quantity of rain-water is $8181 \cdot 25$ ounces and that of air is $9 \cdot 8175$ ounces. Now put $a = 1728 =$ a cubic foot, $b = 19640$ its weight of gold, $s =$ the globe's surface, $t =$ the required thickness of the shell, and $w =$ the weight in ounces; then $a : b :: st : w$, hence $bst = aw$, and $t = \frac{aw}{bs} = 25458$ of an inch when in water; and when $w = 9 \cdot 8175$, then $t = \frac{aw}{bs} = 000305$ of an inch = the thickness when swimming in air; hence the required thickness is 254275 of an inch.

The same answered by the Rev. L. Evans, of Froxfield.

Let $30 = d$, $5236 = n$, $19640 = g$, $1000 = w$, $12 = a$ and $x =$ thickness of the shell when swimming in rain-water. Then $nd^3 =$ solidity of the whole sphere, and $n \cdot d - 2x^3 =$ solidity of the cavity; therefore $nd^3 - n \cdot d - 2x^3 =$ solidity of the shell. Whence, by hydrostatics, $(nd^3 - n \cdot d - 2x^3) = wnd^3$. In numbers, $x^3 - 45x^2 + 675x = 171 \cdot 843177$. Hence $x = 2590309$. And by putting $y =$ thickness of the shell swimming in air, and proceeding in the same way, we have $(nd^3 - n \cdot d - 2y^3) \cdot g = and^3$. In numbers, $y^3 - 45y^2 + 675y = 2062118$. Hence $y = 00030549$, and $x - y = 2587255$, the answer.

Otherwise thus.

Let $30 = d$, $5236 = n$, $19640 = g$, $1000 = w$, $12 = a$, and $x =$ diameter of the cavity when the globe is swimming in rain-water, then $nd^3 - nx^3 =$ solidity of the shell. Now, by hydrostatics, $(nd^3 - nx^3) \cdot g = wnd^3$. Hence $x = d^3 \sqrt{\frac{g - w}{g}} = 29 \cdot 48193$ and $\frac{d - x}{2} = 2590309$, the thickness of the shell. Again, by making $y =$ diameter of the cavity of the globe, swimming in air, and proceeding in the same way, we have $(nd^3 - ny^3) \cdot g = and^3$. Hence $y = d^3 \sqrt{\frac{g - a}{g}} = 29 \cdot 99938$, and $\frac{d - y}{2} = 00030549$, the thickness of the shell. The difference between the former thickness and this, is 2587255 , the answer.

Arithmetically.

Now $\frac{30^3 \times 5236 \times 1000}{19640} = 719 \cdot 815$ cubic inches of gold in the shell swimming in rain-water.

But $30^2 \times 7 \cdot 54 \times 4 = 2827 \cdot 426$, the superficies of the globe.

Then $\frac{719 \cdot 815}{2827 \cdot 426} = 254$, the thickness, nearly.

Again, $\frac{30^3 \times 5236 \times 12}{19640} = 863728$ cubic inches of gold in the shell swimming in air;

and $\frac{863728}{2827 \cdot 426} = 0003054$, the thickness; and their difference 253 is the answer, nearly.

Nov. 14, 1797.

This Question was also answered by Mr. T. Hickman.

Be pleased to notice the following errata: at page 117, of this Magazine, last line of the letter, instead of "insertion of it," read "insertion of this paper;" in the exemplification of case 2, supply the denominator b to x^2 ; thus, " $\frac{x^2}{b} + a = 0$;" in case 6, supply the negative

sign, making it " $\pm \sqrt{\frac{b}{a}}$;" also, at page 118, line third from the top, read " $(-1 \times \pm \sqrt{ab}) \pm \sqrt{ab}$."



Erratum in Mr. Taylor's Translation from Plato.

The concluding paragraph, page 532, "Plato was prevented by death from finishing, &c." should be read as a note of the translator. It is entirely through the carelessness of the printer that it has been thus misplaced.

In page 557, the gentleman, Mr. Greenwood, who is stated to have committed suicide, is, we are told, still living. The correction reached us too late.

END OF VOL. IV.

